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Advance in Cost of Farm Machinery

As an Illustration, the 1916 and 1915 Costs of Materials for a Farm Engine and Boiler Are Compared

BY H. A. RUSSELL

IF we take the 1915 cost of a certain size farm engine and boiler, based on the contracts in force at that time, and add 50 per cent to the figures, we will have a very close approximation to the present total cost of the same outfit. And even at this excessive advance in the cost, it will require from six to eight months to secure the boiler plate, boiler tubes, cold-rolled steel, etc. If, however, the customer is in urgent need of the equipment and desires quick shipment, which under present condi-

a few of the items of supplies out of the hundreds that are regularly purchased and the items that have not advanced are few and far between.

If we omit the labor and manufacturing expense items from the cost of this same engine and boiler, we will find that the cost of the material alone, in 1915, was \$281.94 and at the present time the same material has advanced \$210.88, or a total of \$492.82. If we consider this advance on a percentage basis, the present total is 74 per cent greater than the 1915

Advance in Cost of a Farm Engine and Boiler on Wheels, Material Only, Over the 1915 Cost. The Rates Given Per Pound Indicate the Difference Between the 1915 Prices That Were Paid and the Prices Which Have Been Quoted for the Last Half of the Present Year and Which Apply to Shipments Which Will Be Made by the Mills Many Months After the Orders Are Placed, Except in Quick Delivery Sales, When for Material Shipments in Several Weeks, the Prices in the Last Two Columns Apply

Material or Parts	Weight, Lb.	—Last Half Quotations—		—For Quick Shipments—	
		Actual Advance, Cents Per Lb. or Value	Total Advance	Actual Advance, Cents Per Lb. or Value	Total Advance
Cast iron	6,259	0.3	\$18.78	0.3	\$18.78
Bar steel	1,742	1	17.42	2	34.84
Boiler plate	3,598	2.5	89.95	2.5	89.95
Sheet steel	87	1.6	1.39	2.25	1.96
Cold rolled steel.....	47	2.1	.99	3.6	1.69
Bronze (for bearings).....	30	12	3.60	..	3.60
Crankshaft forging	445	2	8.90	2.5	11.13
Boiler tubes	370 ft.	9	33.30	14	51.80
Babbitt metal	28	8	2.24	..	2.24
Pipe and pipe fittings.....	..	..	1.90	..	1.90
Fittings (valves, gages, etc.)..	..	..	18.58	..	18.58
Studs and bolts and spoke nuts.....	..	..	5.10	..	5.10
Boiler rivets	277	2.5	6.93	2.75	7.62
Tongue, chains, etc.....	..	..	1.28	..	1.28
Paints and varnishes.....	..	..	.52	..	.52
			\$210.88		\$250.99

tions would require from five to seven weeks (providing the size he orders is not in stock), the total cost of the outfit would advance over 60 per cent beyond the 1915 cost figure.

These percentages take into consideration only the advances in the cost of the different materials entering into the engine and boiler and do not take any account of approximately 20 per cent advance in the cost of labor, or the very much higher prices that are being paid for supplies of all kinds which are constantly wearing out through daily service. As a few instances of the enormous advances that have taken effect in the cost of certain supplies, we might state that white waste has advanced over 50 per cent, high-speed steel and high-speed twist drills have gone up from 350 to 400 per cent. Borax (used for welding) has jumped over 100 per cent and prussiate of potash (for case hardening) advanced approximately 1500 per cent. These are only

cost of the material. These figures are based on the supposition that the customer is willing to wait over half a year before receiving the outfit. If so-called quick shipment is required, namely about seven weeks, the advance cost of the material jumps to \$250.99 (in place of \$210.88) and the percentage of advance in the cost will be 89 per cent over the 1915 cost of the same material.

We will now consider the advance in cost of the material, item by item, that is by the weight and rate of advance in cost of each grade of material where possible and by value, as in the instance of bolts and studs, etc.

As stated before, this total indicates an advance of 74 per cent over the 1915 cost of material only. If we pick out the items of steel bars, plates, tubes, sheets, rivets and cold-rolled steel, we will find that these six items advance the cost \$149.98, or 53 per cent.

It must be remembered that these figures represent actual net cost advance in material only and the total cost to the customer will be further advanced by the percentage of profit which must be added, not only to the normal but to the advanced cost of material also, if the manufacturer is to continue to operate his factory successfully. If he does not include a profit on the excess cost of material, he will automatically reduce his percentage of profit and the average percentage of profit on farm machinery and implements will not permit of a reduction. The margin is too close.

So far we have used prices that are in effect for slow deliveries of material. Should the customer want quick shipment and the factory stock is exhausted, owing to the slow deliveries, it would be necessary to buy the tubes from warehouse stock. And there would probably be a certain amount of waste from each tube, owing to the fact that the warehouse length would not be the same as the required length. The cold-rolled steel would have to be purchased from warehouse stock also and in random lengths. There would be a percentage of waste here also. The bar steel and sheet steel would also come from the same source, or if from some mill, there would be a premium price to pay for prompt shipment. As far as possible these prices have been figured close to the average that is being asked. No account has been taken of the extra freight charges that should be added to the price of material when ordered from warehouse stocks. We will find that the percentage of advance jumps to 89 per cent. It is needless to state that only in isolated instances, where the need is urgent, will a customer pay the excessive price. It will be noted that for this condition a number of the articles will not change in value from the figures already given. A certain percentage of the items will be taken from the stock on hand.

Now let us presume that the high prices have been in effect for one year and the factory has on hand at the end of that period 100 engines and boilers made up complete and enough material in stock, rough, partly finished and finished, to complete another hundred outfits of the same size (on the basis of a general average) as the one on which this article is based. The stock must be kept up or the factory must close down. Customers cannot wait half a year for equipment. The season would be over long before the outfit would be received. With enough material on hand to complete 200 outfits, the manufacturer would face a loss of over \$40,000 on this one line alone, if prices should suddenly drop to a normal level again. And it must be also remembered that boilers and engines are usually only a part of the factory output. The total loss would approximate \$300,000 for every million dollars of output.

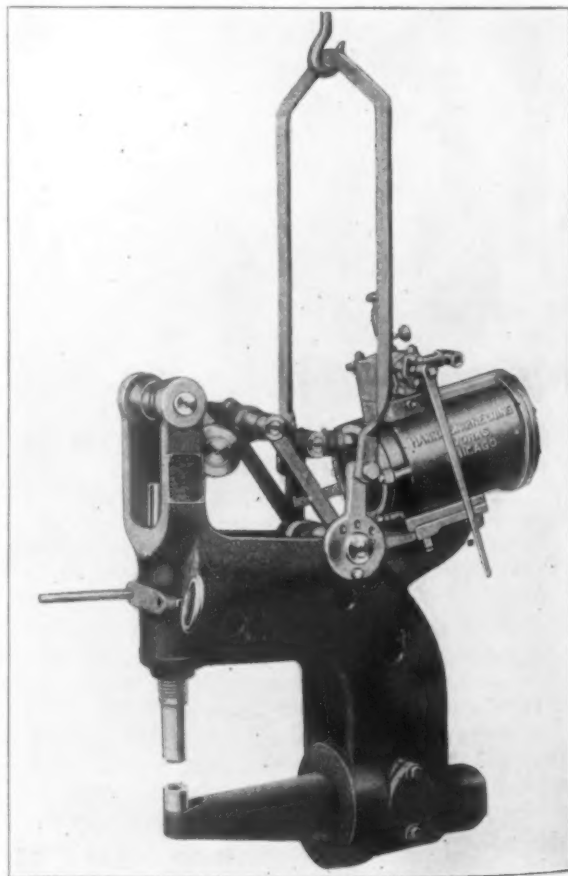
While the percentages will vary according to the size and style of machine or implement and according to the proportion of steel parts to cast iron, etc., the foregoing will give a fair idea of what the manufacturer must face, if the high prices continue much longer. So far the consumer has only paid a very small part of the advance, as the manufacturer has not advanced the price of the finished product in proportion to the present prices of material, but has given the consumer the advantage of what material was on hand purchased under the previous contracts.

A rich vein of lead ore has been found on the north shore of Lake Superior in McTavish Township, according to a report from the Ontario Bureau of Mines. The vein appears to average about 10 ft. wide and contains 8 to 10 per cent copper and about 35 per cent lead.

Riveting Machine for Limited Spaces

Several changes have been made by the Hanna Engineering Works, 2059 Elston Avenue, Chicago, in the pneumatic riveting machine that was illustrated in *THE IRON AGE*, Feb. 10, 1916. The earlier form, it will be recalled, was intended for use in the riveting of lattice columns where the space was limited, and while the one illustrated is likewise intended for working in confined quarters, it is intended for automobile and similar riveted work of close dimensions. The principal change made in the design of the machine is in the lower stake, which is removable and can be shaped to any form best adapted to the work that is being handled. The form of the lower portion of the machine has also been changed to care for this feature.

As was the case with the machine previously described, a combination of toggles, levers and guide links is employed to give the large opening of the toggle joint movement with a gradual increase in the amount of pressure applied until the desired amount is secured, followed by a simple lever movement through a considerable space under approximately the maximum pressure of the machine. This toggle action takes place while the piston is traveling through the first half of its stroke and the die covers the greater portion of its travel in that time. The die completes its stroke in the time required for the piston to travel the rest of the way, this amount being relatively quite small, but enough, it is pointed out, to eliminate any uncertainty regarding the pressure applied to the rivets. The change in the mechanism from that of a toggle to that of a lever is accomplished automatically without a critical point. As the rated maximum pressure is exerted through a relatively large space, it is emphasized that necessity for adjustment to take care of ordinary variations in rivet length, diameter of hole or thickness of plate is done away with after the machine has been once set. This slow movement, it is explained, also gives the metal in the rivet time to flow and fill the hole, in addition to giving an opportunity for the rivet to set prior to the release of the pressure on the return stroke of the die.



This Riveting Machine, Which Was Specially Designed for Use in Places Where the Space is Limited, as in Automobile Riveting, Has a Removable Lower Stake.

THE DIESEL ENGINE

Its Field in Comparison with the Steam Turbine in Good-Size Plants

In a paper by Herbert Hass, to be presented before the American Institute of Mining Engineers at the Arizona meeting in September, 1916, a chart, reproduced herewith, is given, which shows whether it will be more economical to install the steam turbine or the Diesel engine under given conditions of coal and oil costs. While the paper is based on conditions at mine power plants, much of it, however, is applicable to general power conditions.

The author states that about twelve times as much water will be required for condensing with the steam turbine as will be needed for jacket cooling of two-stroke-cycle Diesel engines and twenty times as much water for four-stroke-cycle Diesel engines. Based upon a fuel cost of \$1.25 per barrel of 320 lb. and a lubricating oil cost of 35 cents per gal., the accompanying table was presented as showing the cost of generating power with four 3000 brake-horsepower Sulzer Diesel engines, direct-connected with alternators and exciters. The table is also based upon furnishing full, three-quarters, half or one-quarter load by operating four, three, two and one unit respectively. At full load 70,000,000 kw.-hr. are generated per year and the kilowatt-year is figured at 8760 kw-hr. The cost of the complete plant is estimated at \$720,000, maintenance is figured at one per cent and interest and amortization at 6 per cent each.

Cost of Generating Power with Four 2000-Kw. Sulzer-Diesel Engines Direct Connected to Generators and Exciters

	Full Load	¾ Load	½ Load	¼ Load
	12,000 hp.	9,000 hp.	6,000 hp.	3,000 hp.
	8,000 kw.	6,000 kw.	4,000 kw.	2,000 kw.
Kw.-hr. per year	70,000,000	52,500,000	35,000,000	17,500,000
Barrels	140,000	105,000	70,000	35,000
Cost				
Fuel cost	\$175,000	\$131,250	\$87,500	\$43,750
Labor	18,900	18,900	18,900	18,900
Lubrication	30,660	22,995	15,330	7,665
Maintenance	7,200	7,200	7,200	7,200
Total direct.	\$231,760	\$180,345	\$128,930	\$77,515
Interest and amortization	86,400	86,400	86,400	86,400
Total cost...	\$318,160	\$266,745	\$215,330	\$163,915
Cost per kw.-yr.	39.81	44.51	53.89	83.96

Table II shows the cost of operation under the same conditions, the power being generated with two 6000-kw. turbines. The turbines are to operate at 180 lb. steam pressure, 620 deg. Fahr. steam temperature, 80 per cent boiler efficiency, 60 deg. Fahr. inlet temperature, 75 deg. Fahr. discharge temperature of condenser circulating water; quantity of cooling water per 6000-kw. unit: 74,000 cu. ft. per hour. Commercial generator efficiencies. One unit operates continuously at full load, the other is a standby.

Table II—Cost of Generating Power with Two 6000-Kw. Steam Turbines

	Full Load	¾ Load	½ Load	¼ Load
	8,000 kw.	6,000 kw.	4,000 kw.	2,000 kw.
Kw.-hr. per year	70,000,000	52,500,000	35,000,000	17,500,000
Barrels	300,000	210,000	150,000	83,700
Cost				
Fuel cost	\$375,000	\$262,000	\$187,000	\$104,625
Labor, etc.	25,000	25,000	25,000	25,000
Maintenance	7,200	7,200	7,200	7,200
Total direct.	\$407,200	\$294,700	\$219,200	\$136,825
Interest and amortization	86,400	86,400	86,400	86,400
Total cost...	\$493,600	\$381,100	\$305,600	\$223,225
Cost per kw.-yr.	61.75	63.50	76.60	111.70

The general selection of either type of prime mover will be governed by the following economical considerations:

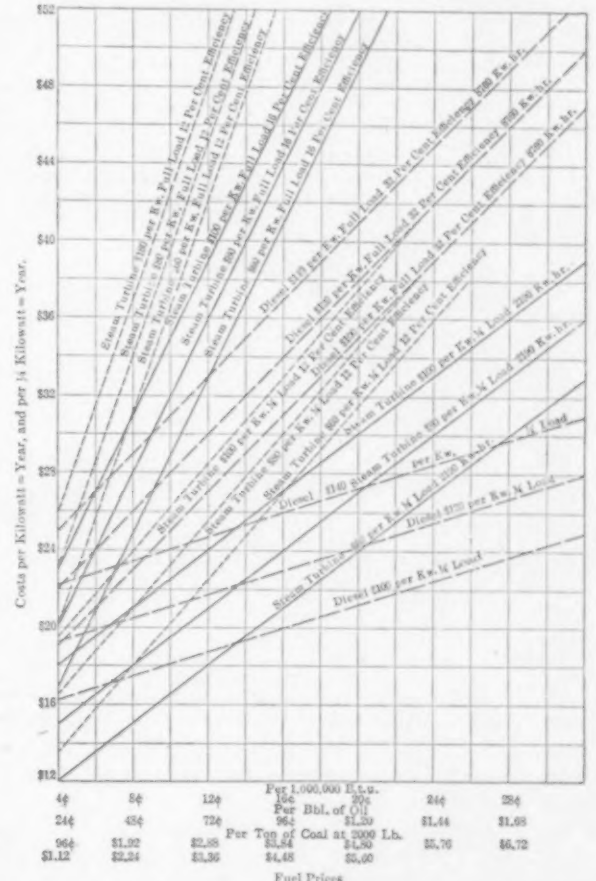
- 1. Where the cost of a given number of B.t.u. is high due to high fuel cost and the load factor also is high, conditions favor the use of the Diesel engine.
- 2. Lower B.t.u. price and low load factor conditions favor the steam turbine due to the influence of interest and amortization costs. This applies particularly

to stationary power plants which are operated only occasionally or have supply recurring peak loads.

3. Conditions demanding readiness for constant and instant service favor the use of the Diesel engine. Against the difference of the interest charges of the Diesel engine and the steam turbine would have to be balanced the cost of keeping the boilers under steam continuously.

4. If the power plant is located at the sources of fuel, either in the oil fields or at coal mines, the steam turbine will be favored as costing less to install, and therefore fuel expenditures will be of less moment than interest and amortization charges.

5. Combination plants using the Diesel engine for supplying continuously and nearly constant main loads and steam turbines for furnishing periodically recur-



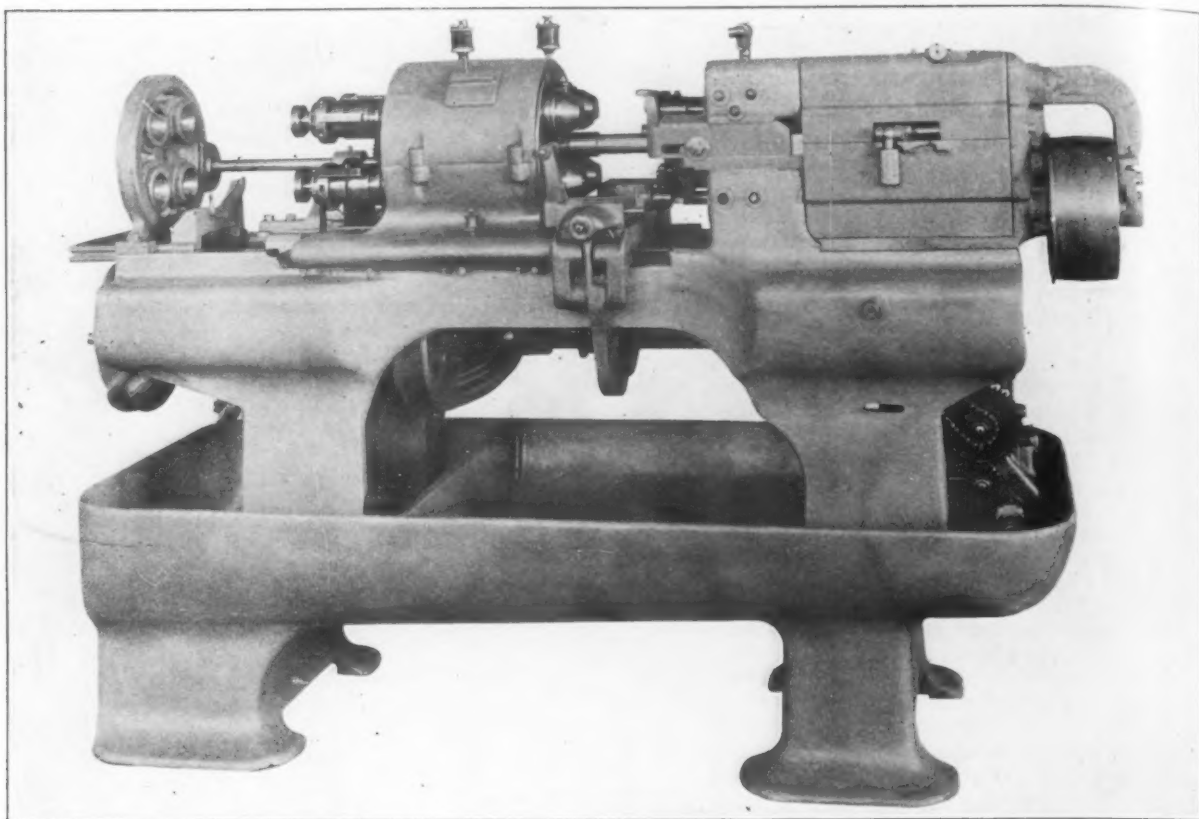
In the above diagram, showing the relative cost of power generated by the Diesel engine and the steam turbine, the oil costs are based on a barrel containing 6,000,000 B.t.u. and the coal costs on one pound's developing 12,000 and 14,000 B.t.u.

ring peaks by the use of high duty boilers with large water and steam space and capable of forcing will prove profitable. Thus such periodical peaks as are produced in hoisting may be taken care of by a turbine floating on the line and operating in parallel with the Diesel engine.

6. Where waste heat gases are available, steam power will prove the cheapest.

7. Up to capacities of 1000 hp., steam turbines can compete with Diesel engines only in special cases, such as supplying exhaust steam for heating purposes. For such small units, particularly for varying loads, high-grade reciprocating steam engines are preferred. Plants between 1000 and 10,000 kw. require careful analysis to determine the relative advantages of the Diesel engine and the turbine. In these analyses load factor, fuel price and water conditions must be considered. For power plants of larger than 10,000 kw., using units from 6000 kw. upward, it is preferable to use steam turbines unless a combination of high load factor, high fuel cost and poor water conditions favor a Diesel plant.

The Granby Mining & Smelting Company, St. Louis, Mo., announces the removal of its New York Sales office from 165 Broadway to the Equitable Building, 120 Broadway.



THE RADICAL SCREW MACHINE

The Fitchburg Company's Automatic Machine
Measures Up to Its Name

BY W. E. FREELAND

After a development and testing period of three years the Fitchburg Automatic Machine Works, an outgrowth of the Fitchburg Machine Works, Fitchburg, Mass., has placed on the market a multi-spindle automatic screw machine in which is incorporated many new and novel features. In the selection of the name Radical for this machine, the designers were guided not so much by the fact that the machine is different and unusual as by the thought that they had attacked the very roots of the mechanical principles and problems involved in turning out screw-machine products and had built a machine for a specific purpose, which machine in conception and construction could not be subject to an accusation that it was a copy of existing machines for the same purpose.

The fundamental principle of the machine is found in the bringing of the work to the tools. The original automatic designed upon this principle was developed by John J. Grant and sold to the Flanders Mfg. Company, from which the Fitchburg Automatic Machine Works secured the original patents. It is the perfection of the principle of bringing the work to the tools which has made possible the present machine. The designers were equipped through long years of experience in the automatic field to know what the trade was demanding in a multiple spindle screw machine, the defects which designers had been striving to overcome, the ranges of speeds most required, the tooling combinations and methods necessary for accuracy and production, and they had learned well the lesson of designing for the convenience of the operator, a point too frequently overlooked in machine tool design. Designing of this kind is not the work of

a moment; some of the most interesting things that the writer saw at the factory were several features which had been discarded or redesigned solely to aid the operator.

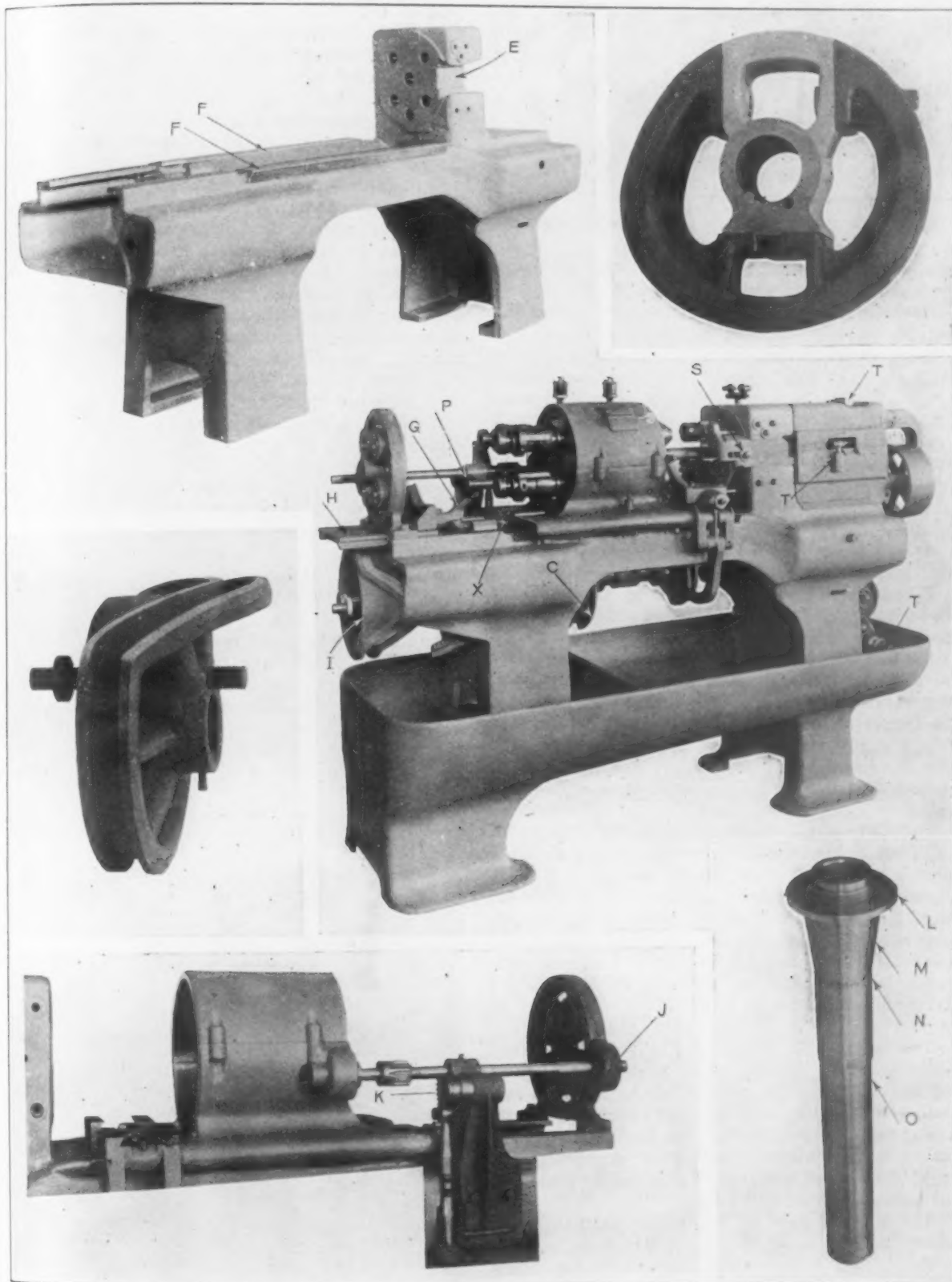
Simplicity is a predominant characteristic; the illustrations emphasize this statement. The various movements of the mechanism are simple and easily adjusted. Whatever adjustments are required are made with the operator in a position where he can see what he is doing, an important factor in securing output. The manufacturers do not claim for the machine excessive speeds nor that it is sold for anything but accurate machine screw work. They do claim that it can be set up very quickly, that there is little opportunity for any of its mechanism to get out of order, that it is designed for the elimination of broken parts and that careful study of the machine and the work produced by it gives credence to these claims.

The design of the pan and bed, the latter shown in Fig. 1, is intended to give the utmost rigidity and consequent close working. The pan has an oil capacity up to 25 gal. and a chip capacity of 318 lb. The striking feature of the bed is the integral tool head, shown in both Figs. 1 and 4, in place of the usual sliding tool head. In previous designs of automatics, the problem has always existed of keeping two opposed and movable sets of surfaces in proper relation to each other and to a fixed center. In this machine it is only necessary to keep one set of surfaces in proper relation to a set of fixed surfaces and a fixed center. If space did not forbid, it would be interesting to describe the design and the extensive use of jigs and fixtures, the grinding operations and some of the assembling features. These can be only briefly sketched to show how accurate working has been made a point of prime importance.

The planing and boring operations for the carriage are all taken care of with one fixture for each and the carriage is then transferred to a grinding fixture which holds it for all grinding operations. For this operation the carriage is rough scraped

to a master bed and later finished scraped to the chilled ways of its individual bed. After the cylinder and spindles are assembled in the carriage, each tool hole is finished from a finishing bar carried in the spindle. The possibilities for accu-

rate and permanent alignment are apparent when it is recalled that the tool head or knee is a part of the bed and not subject to any movement. The turner slide ways are lined and finished from the carriage ways, which ways present the stock to the



SOME OF THE DETAILS OF THE RADICAL AUTOMATIC SCREW MACHINE

Fig. 1—The integral tool head and the turner slide E and the carriage ways FF.

Fig. 2—The lead cam is composed of a hub and a shell. Two shells are provided with the machine.

Fig. 3—Stock feed cam, showing the longitudinal adjustment screw.

Fig. 4—From this view may be noted the absence of brackets, arms and levers. The chuck slide is marked X. The bracket on the bed of the machine is G. The feed tube collar is seen at P, the stock feed slide at H, and the stock feed cam at I.

Fig. 5—The indexing shaft and the stock reel; the extra gear is in the housing J and at K is the sector gear.

Fig. 6—One of the spindles; at L is the end thrust collar bearing; at M the taper bearing; at N the straight bearing behind the taper bearing, and at O the rear bearing.

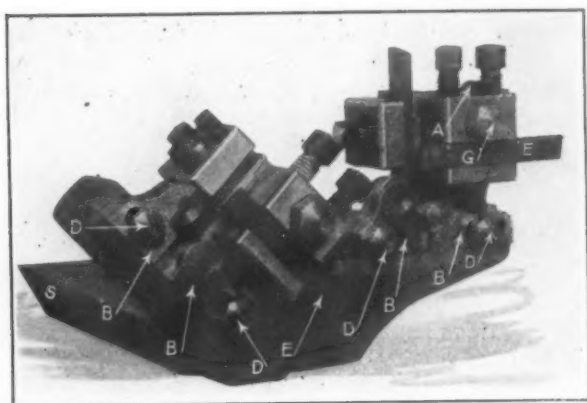


Fig. 7—The Turner Slide Has Micrometer Adjustment

tools when the machine is in operation. All bosses and holes are jig drilled and finished.

The design and operation of the cams are notable features of the machine, especially that point of convenience which has led the designers to speak of them as "stay put" cams. The chuck and chuck release cam, the indexing, the lock bolt and the die cams are never changed. The lead cam hub, Fig. 2, is permanent on the shaft and is provided with two shells to cover the entire range of the machine; the forming and cut-off cam is adjustable for depth of cut. The stock feed cam, Fig. 3, is adjustable longitudinally of the cam shaft for length of feed, but is never changed or adjusted otherwise. All the cams are of steel or semi-steel.

Selective tooling is a feature in that not only can cross slide tools, shank-held end tools and turner slide tools be used but any desired combination of these tools may be employed. This gives the operator unusual scope and freedom in planning his tooling for convenience and best results. The turner slides, Fig. 4, are adjustable longitudinally for any length of cut desired in either the first or second positions and are used alone or in any combination with forming slide or shank-held tools.

In addition, micrometer adjustment is provided for the in and out movement of the cutting blades, a point of convenience in setting up. In Fig. 7, A represents the micrometer adjustment. The graduations are 0.001 in. The operation of the adjustment is to loosen slightly the clamping screw G and raise and lower the blade holder with the micrometer adjustment A. The operator is thus enabled easily and conveniently to get his diameters as he wants them.

The letters BB represent the steady rest roll holder and rolls. Provision is made for adjusting and locating the rolls and for having the rolls and holders held solid after they are located. Whatever the diameter of stock being used, the rolls are always in the proper position for supporting the stock. These roll holders are adjusted by loosening the locking screws D.

The accessibility of the entire mechanism is noteworthy. The longitudinal slides S are scraped to the turner slide ways. The photograph does not give a good idea of the length of the longitudinal slides. From one end to the other the length is 9 15/16 in. on one slide and 9 7/8 in. on the other.

The threading is another distinctive feature, for the machine is designed to permit of any combination of threading and tapping in either the third or fourth position or both, or the threading mechanism may be removed entirely, thus making the machine a plain machine. No changing of cams or strips is necessary in threading operations,

the operator while standing upright being required only to shift two dogs. The machine has hand control from either side.

The illustrations show the noticeable absence of brackets, arms and levers. Chuck and feed shell operating arms are eliminated. A roll on the bottom of the chuck slide X, Fig. 4, acts directly on the cam. A bracket G on the bed of the machine engages the feed tube collar P as the carriage advances, doing away with arms or levers for this operation. A roll on the bottom of the stock feed slide H operates in a groove on the face of the cam I, eliminating arms and levers at this point. As no adjustment or cam changing is required at any of these points, the advantages of the elimination of arms and levers is clear.

The cylinder and cylinder carriage are of semi-steel and the carriage moves on chilled ways. There is no overhang to the carriage as the ways carry the full length of the travel; there is, of course, no overhang to the solid tool head. The elimination of all indexing strain upon the spindle and cylinder bearings is made possible by the continuation of the indexing shaft, Fig. 5, back to the stock reel. The indexing shaft carries an extra gear on the end, which gear J automatically and without any strain on the stock indexes the reel just as the cylinder itself is indexed. The shaft is rotated by a sector gear K. The cylinder locking is of a positive type, which aims for correct alignment with each indexing movement and is of a design which insures completion of the indexing when the locking pin is seated. Two straight and four taper surfaces must wear out before the cylinder can be locked "out of line." The fit is so exceedingly close that it was found necessary to provide an air vent before the locking pin would seat.

The spindles, Fig. 6, are ground inside and out. The spindle bearings have had particular attention, a large end thrust collar bearing in front, a ball thrust bearing in back and a taper bearing in front all working together to take care of the end thrust

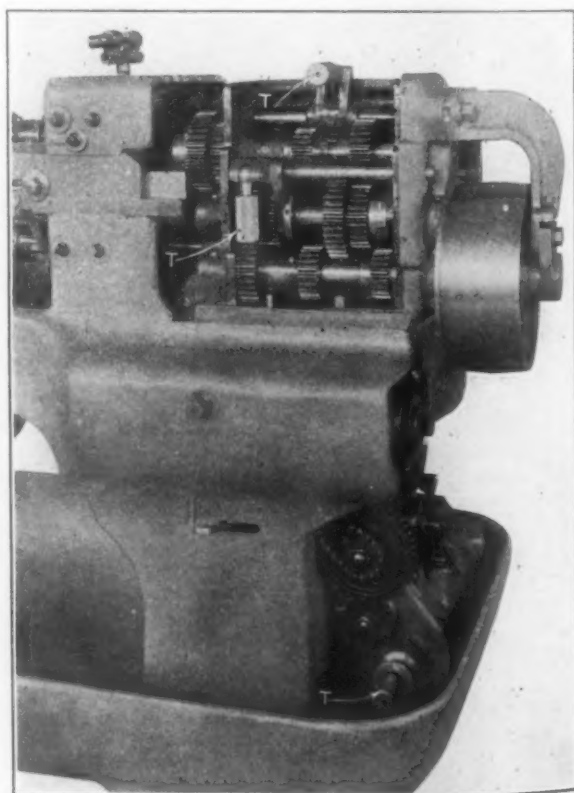


Fig. 8—Gear Drive for Both Spindles and Cam Shafts; at T, T are the Shifting Levers

load. The side thrust is taken care of by the taper bearing, a straight bearing behind the taper and the rear bearing. Three years' actual test indicates that the bearing proportions are well selected. The spindles are steel forgings. Bronze is used for all bearings.

The convenient method of gripping the stock with a master chuck with sleeves is a particularly good feature, replacing the older method of using pads and screws and eliminating the troubles which have been common to their use. The new method provides a master chuck for each spindle, which master chuck will take sleeves for handling stock up to the capacity of the machine. The inside of the master chuck has a ground tapered surface and the outside of the sleeve has a corresponding taper which prevents the sleeves from becoming longitudinally displaced even though there is no stock in the sleeve. For changing over to a different diameter of stock it is only necessary to give the sleeve a slight rap to release the taper, slide the sleeve out and slide in a sleeve of the required size. The advantages of this method are obvious.



Fig. 9—Chucks for the Radical Automatic Machine

The gage stop is positive and rigid, yet is easily removed for setting up. Individual gage stops reduce forming tool variation to a minimum. The oil system is notably simple, a minimum of piping being required between the strainer and the reservoir in the cored tool head.

The machine is of the single-belt gear-driven type. The transmission of power to the camshaft is by chain through a compact and substantial gear box with wide-faced steel gears. The transmission of power to the spindles is through steel gears, the driving member meshing directly with the driven member gears on the spindles. At both points the provision for change of speeds seems to be strictly in accordance with the requirements of the machine with simple, positive shifting methods, as indicated at points T, Figs. 4 and 8.

Great care has been exercised in the selection of metals. High-grade steel and steel castings are used where cheaper metals could have been used. Semi-steel (0.40 per cent steel) is found where a cheaper cast-iron construction would not have been subject to criticism.

Two sizes, 1 in. and 1¼ in., are now being built and other sizes will soon be added.

Puddlers in eastern Pennsylvania rolling mills had their wages advanced Aug. 1 to \$7 per ton, the highest rate ever paid in that part of the country. The former rate was \$6 per ton.

Basic and Acid Castings in the United States and Germany

The greater extent to which basic steel castings are used in Germany rather than acid steel castings is indicated by the following table, showing the percentage of acid castings in the total open-hearth castings output of the United States and Germany for the last 15 years:

Years	United States—		Germany—	
	Acid Castings, Per Cent of Total	Total Open-hearth Castings, Gross Tons	Acid Castings, Per Cent of Total	Total Castings, Metric Tons
1901....	68.4	301,622	37.0	107,210
1902....	69.6	367,879	40.0	116,524
1903....	66.3	400,348	34.3	131,756
1904....	67.5	302,834	30.3	152,814
1905....	60.9	526,540	35.1	186,131
1906....	56.5	719,891	41.0	189,313
1907....	50.9	746,525	40.4	211,498
1908....	50.4	311,777	40.1	192,883
1909....	49.0	601,040	40.3	206,456
1910....	49.7	863,351	42.5	262,811
1911....	53.3	571,191	37.9	269,372
1912....	49.0	870,848	31.1	321,663
1913....	49.4	910,216	30.1	362,916
1914....	44.7	604,317	29.1	298,338
1915....	54.7	735,332	27.8	694,515

While the total casting output in Germany in nearly every year has been much less than that of this country, the acid steel casting percentage has in no one year been as high as in the United States. The fluctuation in the percentages of acid and basic castings has been greater from year to year in Germany while in the United States the change has been a gradual increase for the basic. The highest acid percentage in Germany, 42.5 per cent in 1910, is less than the lowest in this country, at 44.7 per cent in 1914. In both countries the growth of basic steel for castings has been on the whole progressive.

The very large increase in the total German output of castings in 1915 is striking—694,515 metric tons against a previous high of 362,916 tons in 1913. As only 27.8 per cent of the total last year was acid castings, the sudden expansion in basic output is noteworthy. It is probably due to the large stocks of scrap steel as well as to the abnormal demand for castings for motor truck and other uses.

The jump in the relative output of acid steel castings in the United States in 1915 is rather surprising—from 44.7 per cent of the total in 1914 to 54.7 per cent or the largest since 1906, the totals for 1915 and 1906 being nearly the same. This may be partly explained by the large demand for castings for machine tools and to a lesser extent for locomotives as well as the small number of cars built in 1915.

Blow Cock for Cleaning Purposes

For use in connection with the compressed air systems found in machine shops and foundries, Stevens & Co., 375 Broadway, New York, have developed a special blow-off valve. This is known as the Stevens auto blow cock and is intended for removing chips and borings from machine tools, work benches and grinding machines, as well as for cleaning machine parts before assembling. It is intended for attachment at the end of an air hose and the amount of air discharged is regulated by pressing a handle on the side of the valve. The valve is fitted with a tapered metal to metal seat and is held in position by a coil spring. This arrangement is relied upon to prevent accidental opening or leakage under high pressure. Other uses to which the device may be put are for cleaning down automobile engines and frames in garages and reaching inaccessible places around axles, wheels and the steering gear.

The Seattle Car & Foundry Company, Seattle, has received orders from the Alaskan Railway Commission for about \$12,000 worth of clamps, blocks, forgings and other material to be used in constructing the Government railroad in Alaska. The company reports an unusually busy season in forgings and castings besides its carbuilding operations.

MAKING COPPER CLAD STEEL

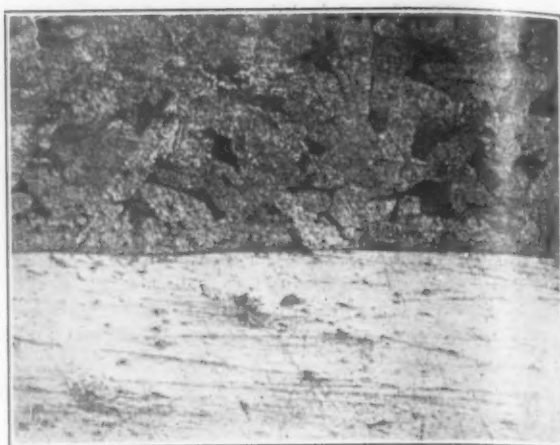
Methods of Producing Commercial Shapes with a Protective Coating

A great variety of steel products to which a coating of copper has been welded are being placed on the market by the Copper Clad Steel Company, Rankin, Pa. It is planned to furnish copper clad steel for all purposes for which pure copper is now used at a price, it is stated, approximately 30 per cent less than that of copper. The use of the steel secures increased tensile strength and higher elastic limit than obtainable with the all-copper article.

Open-hearth steel rounds, 4 and 4½ in. in diameter, with a carbon content of 0.08 to 0.30 per cent are used. The material is delivered in 15 to 18 ft. lengths and is first cut into pieces about 30 in. long. These are taken to a pickling machine where they are immersed in sulphuric acid to remove the dirt and scale. The bars are next scrubbed and washed and covered with a specially prepared flux which, it is explained, prevents oxidation of the surface of the bars.

The next step in the process is to place the bars in plumbago molds, which are 5½ in. in diameter and about 30 in. long. The underside of the cap of the mold contains a recess which is relied upon to center the bar in the mold. A pouring spout is also employed on the top of the mold to keep the bar from floating when the molten copper is cast around it. The molds are loaded on buggies and taken on a narrow-gage track into a special heating furnace, designed by the company. They remain in the furnace until the desired temperature is reached, electric pyrometers being used to measure the heat. Copper, heated to a temperature of 1980 deg., is poured over the steel bar. The bars meanwhile go through a special treatment which, it is claimed, adds approximately 30 per cent to the strength.

The molds are then taken out of the furnace and after they have been removed the bar with its copper coating is placed in a Tate-Jones gas-fired heating furnace. The bar now goes to a roughing mill, where it is reduced to 3¾ in. in diameter and its length is increased to 6 ft. in six passes. After a second reheating, the bar goes to a 12-in. roughing mill and then to a 10-in. finishing mill, the finished product having the diameter of ¾ in. In the finishing passes the bar is rolled into various shapes, such as rounds, flats, angles and ovals, which process tests the bars severely and insures that the copper has adhered rigidly to the steel.



The Close Contact Secured Between the Steel and the Copper Covering. (The Cut Is a One-Third Reduction from a Photomicrograph at 100 Diameters)

The ¾-in. rod is then drawn cold for any commercial size of wire desired.

One of the accompanying illustrations is a reduction two-thirds the original size of a photomicrograph at 100 diameters and is offered to show the entire absence of alloy and the complete welding of copper and steel. After the rods have been rolled, a piece 30 in. long is cut from each and tested for conductivity. When the material is placed in acid the steel dissolves throughout the entire section without accelerated action at any point, thus showing apparently that there is no electrolytic action. When exposed to the corroding action of acids or atmosphere, it is explained, that while the ends corrode slightly a protecting film is formed on the steel which prevents further corrosion.

The larger halftone shows some of the products made by the company subjected to tests. No. 1 at the left is a view of a piece of copper clad steel after the original passes through the finishing rolls. The next is a wire rod which was given four circular twists to show the elongation and then filed to show the uniformity of the steel and copper weld throughout. The piece in the center is a wire rod which after being given 16 twists when cold was heated and plunged in cold water. A portion of this rod was also filed to show the uniformity of the weld. No. 4 is a rod which after being heated to a high temperature was plunged in cold water and hammered 20 times on each end. The view at the extreme right is the same piece after being cut in two and the two ends of the piece hammered together when cold.

The Copper Clad Steel Company was formed in May, 1914, at Pittsburgh and was incorporated



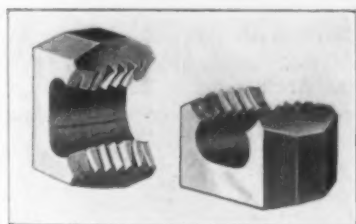
Some Copper Clad Products That Have Been Subjected to Tests

under the laws of the State of Pennsylvania a year later with a capital stock of \$250,000, which was increased about two months ago to \$350,000. A site of about four acres was leased at Rankin, Pa., a few miles from Pittsburgh. The plant, which consists of two buildings, one 120 x 240 ft. and the other 120 x 150 ft., has direct switch connections with Pittsburgh, McKeesport & Youghioghney and the Baltimore & Ohio railroads. The smaller of the two buildings was recently completed and at the present time an 18-in. mill is being installed. This will increase the output from 10 to 50 tons per day and enable sheets and plates to be supplied as well as wire rods, which the company is furnishing to the Page Woven Wire Fence Company. Three new type electric furnaces are being installed for melting the electrolytic copper ingots which the company uses, and a new electric heating furnace is being installed to heat the steel bars. With this new furnace the bars will be heated in 15 min. instead of from 2 to 2½ hr.

The officers of the company are J. M. Roth, president; William Smith, vice-president; S. E. Bramer, second vice-president; S. F. Loeb, treasurer, and F. R. S. Kaplan, secretary. Mr. Roth, who is a chemist, began the development of the process, which is covered by patents, about 10 years ago. He was assisted in this work by J. W. Reisz, a mechanical and electrical engineer.

Double Reversible Screw Plate Dies

A die made to cut from both faces is being furnished in all the screw plates made by the Russell Mfg. Company, Greenfield, Mass. In addition to this feature it is also possible to turn the die over in the holder when one set of cutting edges becomes worn and bring the other into action. This combination of the two features has given the dies their name of double reversible.



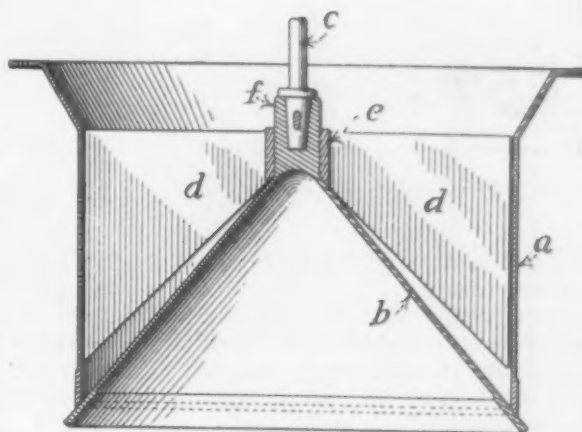
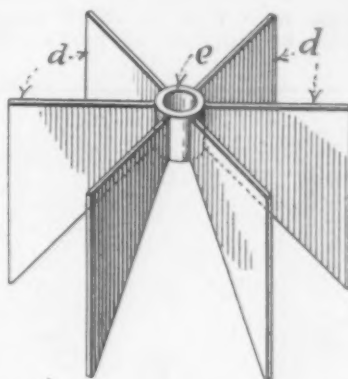
A Screw Plate Die Capable of Cutting from Both Faces

With this type of die it is pointed out that work which formerly could not be done easily can be readily accomplished. When a thread is to be cut close up to a shoulder or a very short piece is to be threaded, the cut is made from the front face of the die. In this way it is pointed out the space which the thickness of the guide prevents from being utilized when the cutting is being done from the guide side of the die can be threaded and the thread cut directly up to the shoulder or to the work holder. It is also possible to use the same die for either hand or machine work without turning the die over. The ability to turn the die over and bring the other set of cutting edges into play when one has become worn doubles the life of the die.

The David Ranken School of Mechanical Trades at St. Louis, Mo., which has completed its seventh scholastic year, at the graduating exercises July 19 granted diplomas to 95 graduates, the largest number since the school was established. Its total enrollment for the year was 867, of which 275 were in the regular day classes, 526 in the evening classes and 66 in co-operative apprentice classes. The diplomas granted were as follows: Plumbing, 16; carpentry, 5; painting, 3; pattern makers, 4; steam engineers, 7; machinists, 15; electricians, 23; bricklayers, 1; metal trades apprentices, 21. The school has become recognized as thoroughly practical in its instruction and is encountering no opposition from the trades unions in the various lines taught. It is conducted under an endowment by its founder, which provides not only the buildings and grounds of most modern type, but ample funds for the operating expenses.

Charging Bell for Blast Furnaces

An improvement in charging bells for blast furnaces is covered by a patent (U. S. 1,178,522, April 11, 1916) granted to Julian Kennedy of Pittsburgh. It has been designed for guiding or controlling the charge and maintaining the bell in



Details of Charging Bell for Blast Furnaces

its proper position, so that each charge will be approximately equally distributed around the furnace—a feat usually difficult to accomplish.

The illustration shows part of the details, in which *a* designates a blast-furnace feed hopper and *b* the discharge bell with a supporting and operating stem, *c*. There are radial wings, *d*, so arranged as to retain the bell centrally within the hopper and also to provide guides for the charge, so that the material will move in a radial direction and be restrained from moving at a tangent with relation to the center of the hopper. The wings *d* do not extend to the upper face of the bell at their outer edges, permitting the material passing through one section to spread out and meet that passing through adjacent sections. These wings are cast as part of the hub *e*, mounted on the boss *f*.

Monarch Machinery Company's New Building

The Monarch Machinery Company, now at 249 North Third Street, Philadelphia, has purchased the granite building on the northwest corner of Third and Vine streets, formerly occupied by the National Bank of Northern Liberties. When the architect and builders get through with their work, the company expects to have one of the largest and best equipped machinery stores in the country. After the Monarch company moves, its present store will be occupied by the Advance Machine Company (Joseph A. Wolle, proprietor), now at 911 Vine Street, in the same city, builder of magnetic separators, special tools, dies and jigs.

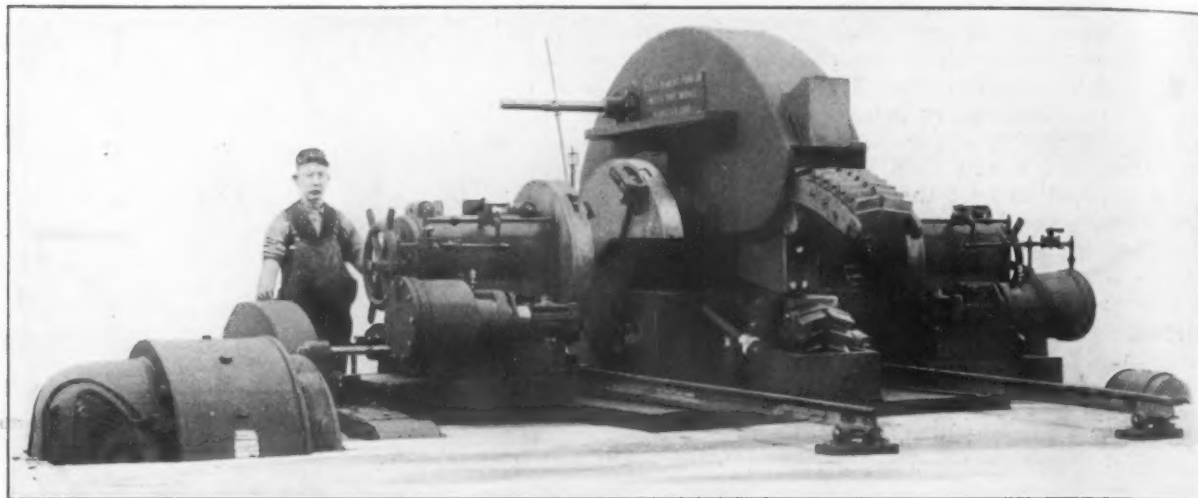
A HEAVY CARWHEEL LATHE

Hinged Driving Pinion Segment Acts as Automatic Wheel Locking Arrangement

An unusually heavy carwheel lathe has been brought out recently by the Niles Tool Works Company, Hamilton, Ohio, and has passed final tests in outside shops. As will be noted, the machine is provided with central driving gears and pinion of

unlocks and opens as they are rolled out. The operation of the segment requires no manipulation by the workman.

The wheels are rolled into the lathe on a short hinged track that connects with the shop track. For aligning the wheels with the center of the tailstocks, an elevating device driven by a 5-hp. constant-speed motor is provided. The wheels are centered by tailstocks which are moved on and clamped to the bed by powerful air cylinders. The tail-



A Very Heavy Lathe for Carwheels Having a Hinged Segment of the Herringbone Driving Pinion That Works Automatically to Admit and Release the Wheels

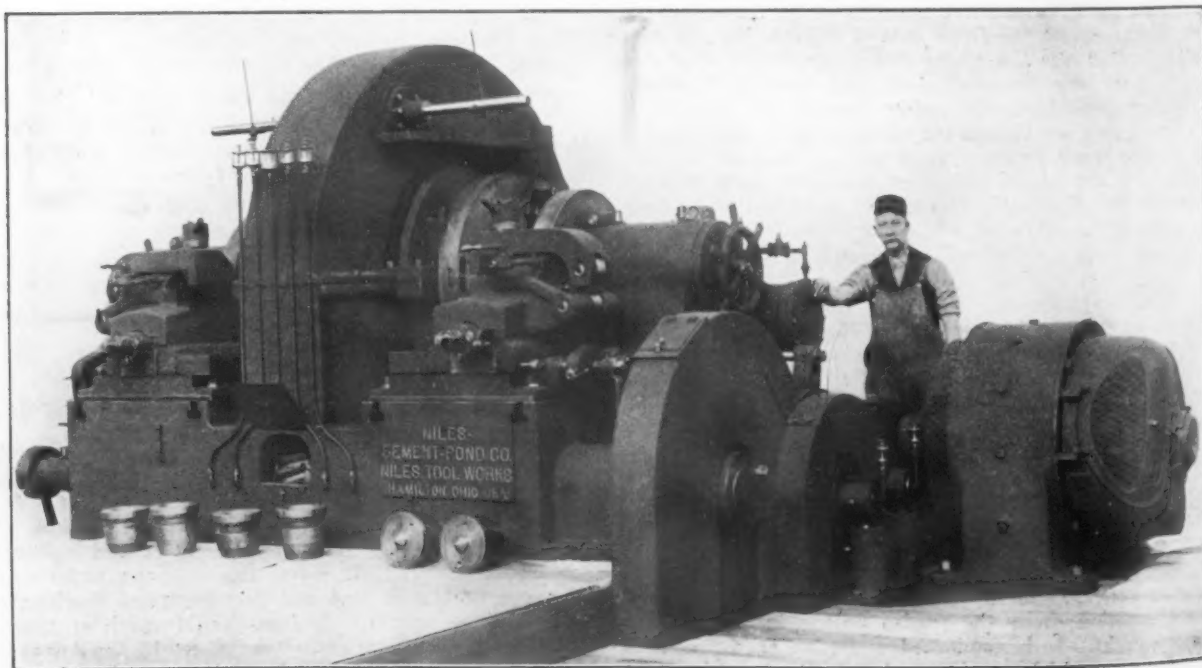
the double herringbone type. It is claimed by the builder that for transmitting heavy torque, as required in this class of work, the herringbone gear offers several advantages: first, its construction eliminates all end thrust, and, second, this type of gearing is very smooth in operation, due to the spiral action of the teeth.

The central driving gear is mounted on a so-called driving spool, which revolves in large bearings in the bed. This spool has two faceplates that carry the drivers and an opening of 10 in. to receive the axle. The driving gear has a patented hinged segment which works automatically. It closes and locks as the wheels are rolled into the lathe, and

stocks are controlled by air valves within easy reach of the operator, as shown.

For wheels on axles with outside journals collapsible bushings fitting over the journals and tapered to fit the tailstock spindle are furnished. This method is relied upon to insure the treads of the wheels being concentric with the journals.

All gears are of steel and are fully covered with guards. Wipers are attached to the tailstocks to keep the track free from dirt and chips. Each faceplate of the driving spool is equipped with three drivers, that engage the inside of the wheels near the circumference. These drivers are tightened by hand and exert a uniform pressure on the wheels.



The Tailstocks Are Adjusted to the Wheel and Clamped in Place by Compressed Air and All the Gears Are Guarded

The tailstock faceplates are provided with independent chuck jaws that engage the outside of the wheels and support them against the thrust of the drivers. Thus the wheels are held with absolute rigidity. The tendency to chatter is said to be eliminated and the axles are relieved of all deflecting or torsional strains.

The tool rests are equipped with pneumatic clamps that enable the operator to change and clamp the tools in a few seconds without the use of a wrench. The tools are clamped by a wedge action which forms a positive lock independent of the air pressure. The tool slides have in and out adjustment for setting depths of cuts and also hand longitudinal traverse. The tool slide screws are fitted with ball thrust bearings. The rests can be swiveled to provide for the taper of the wheel treads.

The power feed is obtained by direct gearing, and is positive in action. The range is from $\frac{1}{8}$ to $\frac{3}{4}$ in. per revolution of the faceplates. There are 6.4 feeding strokes per revolution of the faceplates, giving practically a continuous feed.

The machine is gear driven by a 50-hp. motor. When direct current is used the speed variation is 3 to 1, and when the lathe is driven by direct-current motors they are equipped for dynamic breaking. This last feature enables the operator to stop the driving spool in any desired position, and also to obtain a fine adjustment when elevating the wheels to the center of the tailstocks.

The lathe will turn wheels from 26 to 42 in. in diameter on the tread. It will take the largest M. C. B. axles with outside journals up to $6\frac{1}{2}$ in. in diameter, and will take axles up to $9\frac{1}{2}$ in. in diameter with inside journals. The maximum distance between centers is 94 in., and 96 in. between tailstock faceplates.

Hollow Axles and Alloy Steels for Locomotives

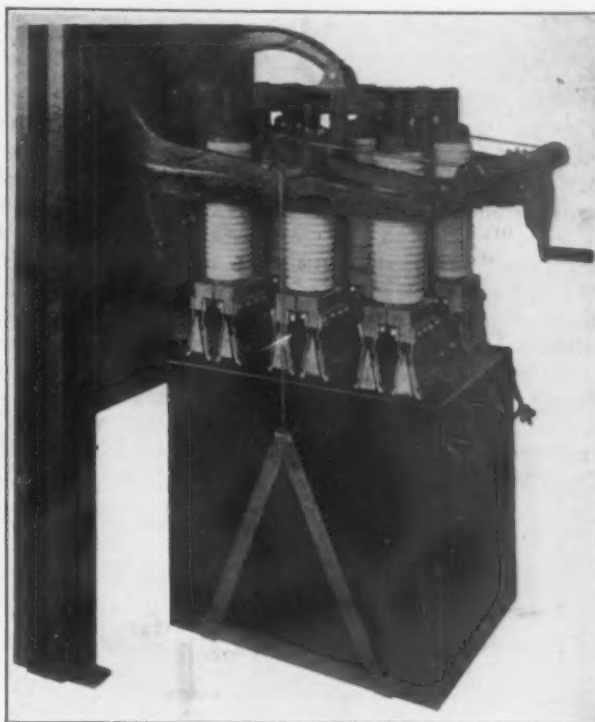
That hollow axles and crank pins of alloy steels are a great saving of dead weight in locomotives is the view of L. R. Pomeroy in a paper on "Alloy Steels in Locomotive Design," presented at the annual meeting of the Railway Master Mechanics' Association at Atlantic City, N. J., June 19 to 23. In addition, there is great benefit in hollow forgings for purposes of inspection. The increase in outside diameter is so small, to produce an axle as strong as the equivalent solid axles, that for old equipment a hollow axle can be substituted without changing the size of boxes. Commenting on the paper, the *Railway Age Gazette* said:

The reduction in the weights of finished parts in a 2-10-2 type locomotive, accomplished by the use of special steels, may very easily be made to exceed 4000 lb. and in a Pacific type locomotive 2000 lb., both of these figures including the saving made by reducing the weight of the counterbalances. The use of hollow axles alone in a 2-10-2 type locomotive would save in the neighborhood of 1000 lb. Aside from other considerations the value in a direct way of the saving effected by the substitution of alloy steel for carbon steel in the piston rods, crossheads and pins, side rods, crank pins and valve gear, and the use of hollow driving axles, will be readily seen when it is considered that the resultant reduction in weight would permit an additional weight in the boiler which would add fully 2 in. to its diameter. Moreover, the increases in power which are being made in American locomotives should prompt designers to look into the future, when it may be necessary to use these special steels in other parts than those named, in order to keep the weight within reasonable limits.

The Ferguson Steel & Iron Company, Buffalo, believing that in order to produce the greatest efficiency in the employee some recreation is necessary, has constructed on the ample grounds at its works tennis and handball courts, besides providing for facilities for baseball. The general appearance of the grounds has been greatly improved by the installation of these recreation adjuncts.

Improved Lifter for Oil Tank Switches

The line of tank lifting arrangements for oil switches of various forms and sizes built by the General Electric Company, Schenectady, N. Y., has been increased by the addition of one designed for switches having a capacity up to 1500 amp. The first of these devices, which was designed for comparatively small switches, was illustrated in *THE IRON AGE*, July 22, 1915. This is operated by a lever arrangement, while the one that has just



An Improved Form of Lifting Device for Oil Switch Tanks Employing Two Triangular Supports Controlled by Cables and a Worm Geared Handle

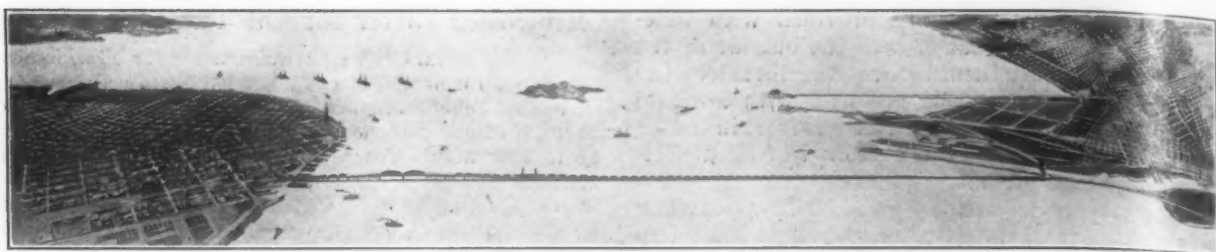
been developed uses a worm gear and two cables to lift the tank the entire distance between the switch frame and the floor or to lower it.

When it is desired to remove a tank, the lifting device is placed on the frame of the switch and fastened in place by turning two wing nuts. When the operating handle is turned it operates through a worm and worm gear to turn the bar on which the lifting cables are wound. The movement of these cables causes the two triangular supports for the tank, which ordinarily are a short distance below it, to bear against the bottom of the tank so that it can be easily lowered to the floor or any desired intermediate position as soon as the fastenings are loosened.

By moving the pulleys over which the cables run slightly forward or back it is possible to adapt the lifter for various sizes of the switch. When the tank that is to be handled is smaller than the one previously put in place, the pulleys are moved forward while for a larger tank the motion is, of course, reversed.

New Boiler Wall Coating

A new boiler wall coating has been placed on the market by the H. W. Johns-Manville Company, Madison Avenue and Forty-first Street, New York. This covering, which is known as J-M Aertite, forms a tough rubbery coating or blanket over the entire boiler setting, which, it is explained, remains tight on account of its adhesive and ductile qualities, thus preventing air infiltration. The material is applied by troweling and the thickness of coating recommended is $\frac{1}{16}$ in., from 25 to 40 lb. being required to cover 100 sq. ft., depending on the number and variety of cracks and the manner in which the wall has been pointed up. In a test made at a large boiler plant in New York it was found that by the application of this coating the amount of CO₂ was increased $2\frac{1}{4}$ per cent after the flue gases had passed the first baffle and 16.4 per cent after they had passed the second baffle.



The Proposed San Francisco-Oakland Bridge

Cost: \$22,000,000. Length: 5½ miles, in 87 spans, 60 of them 250 ft. long and two of them 600 ft. long. Two Decks: Three roadways on upper, two for slow-moving trucks and one for high-speed automobiles; four electrified railroad tracks on lower, two for overland trains and two for interurban trains. Provision is made for the passage of ships by high spans near the San Francisco shore, which ships will go under, and by two movable spans. Maximum grade on the bridge is 2½ per cent.

It is proposed to organize a bridge district of the counties of San Francisco and Alameda, which would build the bridge and charge a toll for its use sufficient to pay the interest on the bonds and to maintain it. Over 40,000,000 persons are carried across the bay every year by the ferries. The site of the bridge is generally shallow and is said to be beyond 95 per cent of the present shipping. Quicker transportation across the bay without danger due to the daily fogs is a factor in the demand for the bridge.

Plans have been under preparation one year. Chambers of Commerce of the Bay Cities have been investigating project over four months. Plans are now in hands of Federal Government for approval; a board of Army engineers has been appointed by Secretary of War to investigate the plans, and a public hearing by Army engineers will be held in San Francisco and Oakland Aug. 15 to 18. The engineers are Wilbur J. Watson & Co., Cleveland; William Russell Davis, Albany, N. Y., and Harlan D. Miller, New York.

BRITISH SHELL FACTORY

Typical of Several Plants, Privately Managed but Government Owned

Great Britain has provided for several large-scale projectile-making factories, built with government money but designed, equipped and operated each by a private company which has achieved distinction as a manufacturer. These plants are supplementary to the government arsenals and the old-established private munitions works. They receive steel in the form of billets and forge and machine shells therefrom. They are not concerned with the loading of the shells nor with the making of the fuses, but do make the steel noses, which are screwed into the ends of the shells. One of the plants is described in a general way in *The Engineer*, of London, which says that nine-tenths of the battle in the manufacture of modern artillery projectiles is the production of the steel shells. From this article are taken the following notes:

There is no reason why a shell should not be completely machined on a single lathe. Such a lathe, however, would not be a simple machine, for it would require to have as many adjustments as there are operations to perform on the shell. None but a skilled workman with long training could readily learn to operate it. The machine tool makers and other engineering firms set to work to produce specialized shell lathes. Instead of designing and making a lathe capable of performing the fourteen or so operations required on a shell they constructed fourteen different types of machine, each of which was specialized to do a single one of the operations and no more. The simplification of the mechanism in each case was carried to a truly remarkable degree, and as a result girls and others with no previous acquaintance with the inside of an engineering factory could be taught to use the machines efficiently in anything from a fortnight to a month.

The factory is really in two parts. At one place the shells are rough-shaped by forging. They are then taken on railroad cars to the second part of the factory about a mile or so away, where they are machined to shape and size, bored internally, screwed at one end for the nose pieces, varnished inside and painted outside.

The factory when visited was engaged on the pro-

duction of 60-pounder high-explosive shells. The raw material as received consists of billets of steel some 4½ in. square, 15 in. long, and weighing about 80 lb. The steel has a breaking load of about 90,000 lb. per square inch. The billets arrive on a siding shown in the general plan of the shop. Three overhead electric traveling cranes command the billet yard and powerful electric magnets are used for handling, sometimes five billets at one time by each crane.

The billets are deposited on steel plate tables at the furnaces, which are of the continuous type with hydraulic pushers. The fuel used is coal and the coal is gasified within the furnace itself, the billets being heated by the combustion of the gas and not by the actual combustion of the coal.

THE FORGE SHOP

A row of hydraulic forging presses is arranged down the center of the forge shop. Each furnace serves a separate press. From a point above the furnace outlet door to a point on the press structure a stout wire rope is stretched. On this runs a pulley from which a chain depends. To the chain a pair of tongs is attached. The white hot billets can thus be readily and quickly, one at a time, pulled out of the furnace and carried over to the press. On the way across any scale formed on the surface of the billet is knocked off with pointed bars of steel. The corners of the billet as received are rounded off so that the length across the diagonals is about equal to the diameter of the forging.

The hydraulic presses are worked by water under a pressure of 1200 lb. per square inch. They are of the vertical type and consist of a bed-plate upon which four pillars are erected. The main hydraulic cylinder, which does the forging work, is inverted and carried by these four pillars. The bed-plate also carries a pair of guides upon which there runs a carriage carrying two large steel pots, within each of which is placed a steel mold or container. The carriage with these pots is moved to and fro on the guides by a horizontal hydraulic cylinder. Each pot alternately can thus be brought under the forging cylinder.

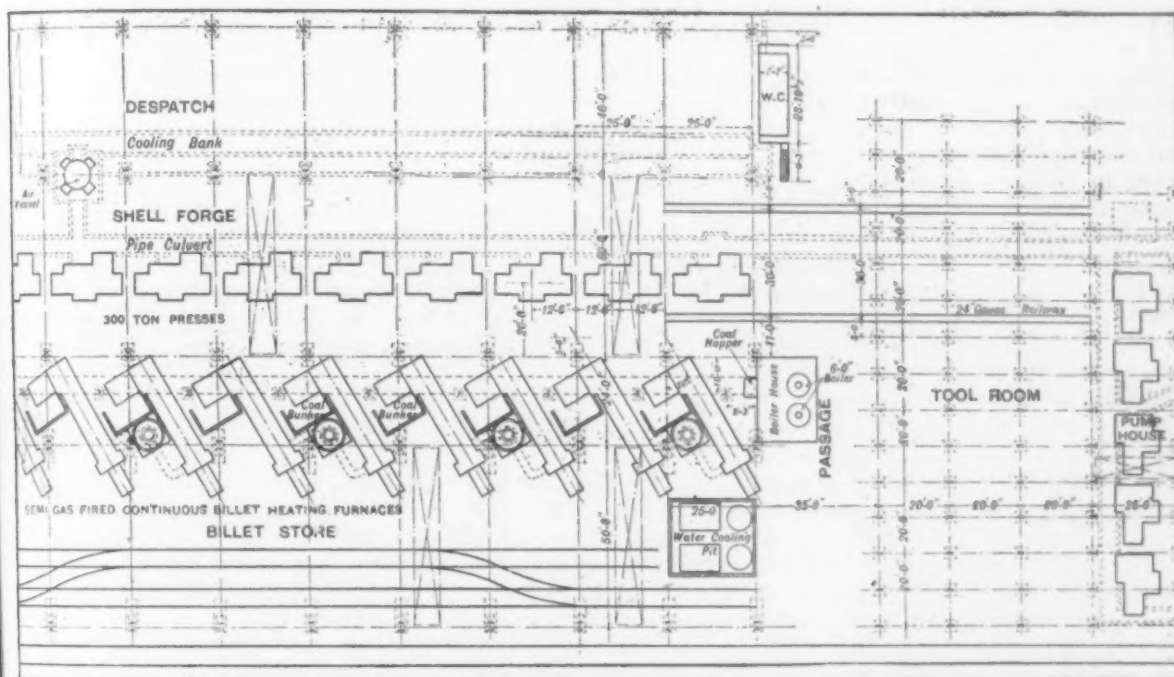
At each end of the bed-plate a small vertical hydraulic cylinder is sunk into the ground. The rams of these cylinders are used to eject the finished forgings from the mold in which they have been formed. While one billet is being forged the preceding one is being ejected.

The ejector ram when it rises enters a hole in the bottom of the pot. Rising farther it enters a similar sized hole in the bottom of the container or mold. This hole just fits the diameter of the ejector ram and is smaller than the diameter of the finished forging. In section, therefore, the container or mold shows a round bore of diameter equal to that of the forging and carried to a depth which exceeds the length of the untouched billet by a short amount. At the foot of this bore comes another one of smaller diameter, equal, in fact, to that of the ejector ram. On the circular step thus formed a round plate rests loosely. This supports the bottom of the billet while it is being forged, and can rise on the top of the ejector ram when the billet is forced out of the mold.

There are two of these punches on each press. These two punches are mounted on a slide which can be moved in a direction at right angles to the guides on which the pots run. Just as these pots are brought alternately beneath the forging cylinder, so, too, are the punches. The two punches are so connected that they move in unison. Thus, when punch *A* is being forced by the ram of the forging cylinder into the billet punch *B* is also descending. In so descending

is outlined in the accompanying sketch; *A* is the end of the shell and *B* is a lever, one arm of which is provided with a roller which rests on the surface of the shell at a point near its closed end. The other arm of the lever is a pointer. The shell is slipped over a power-driven spindle *C*, which just fits its bore. When it is rotated the end of the pointer must not pass outside two gage marks *D* inscribed on a board fixed behind the pointer. If it does, the shell is too eccentric to be passed. The eccentricity is thus examined at the closed end of the shell. If there is any eccentricity it will be most marked at this point. The device enables a large number of shells to be inspected in a very short time.

The containers, the punches and other parts of the presses have frequently to be renewed. The renewals are made and carried through by the staff of the tool room, the location of which is shown on the plan. Beyond the tool room is the pump house, which supplies the pressure water used by the forging presses. Here are to be found some electrically driven pumps, each with three rams and all delivering into an accumulator. The current to the motors driving the pumps is controlled automatically in such a way that as the



Plan of One of Several Government Owned but Privately Managed Shell Forging Plants in Great Britain

it passes into a pot of water where it is cooled. It is then ready to be moved across into the forging position and to deal with the succeeding billet. It will thus be seen that while one billet is being forged the preceding billet is being ejected and the succeeding billet being got ready in position. Simultaneously, the punch for the succeeding billet is being cooled.

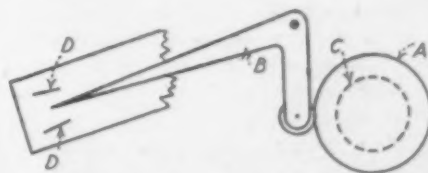
To permit the punch to be withdrawn from the shell without dragging the shell out of the mold, two bars are fixed across the top of the pot at a distance apart which will permit the container or mold to pass between them as is required when the mold has to be replaced. When the forging is over, except for the withdrawal of the punch, a V-shaped block of steel is slipped beneath these bars. The limbs of this block pass on either side of the punch. The bottom surface of the block rests on top of the mold and overlaps the lip of the shell. With this block inserted, the punch can be withdrawn, the block and the bars meanwhile holding the shell down.

FIRST INSPECTION

An interesting mechanical device is in use to assist in the inspection process. It is intended to detect any shells which have been forged eccentrically. The device

demand for water increases or decreases more and more of the pumps start or stop working.

Both male and female labor are employed in the tool room. The portions of the presses actually coming into contact with the hot billets require very frequent renewal, particularly so in the case of the punches and their components. Arrangements have therefore been made for the production of these articles on the principle of specialized working and the greater part of this work is carried out by women. The renewal



Device for Testing Eccentricity of Shells

of parts of the valves, however, and other delicate adjuncts of the presses remains in the hands of skilled male workers, who are also responsible for the management of the workshop and the instruction of the women.

The Passing of the Acid Bessemer

Phases of Its Career in the United States
and Great Britain — Ores an Important Factor—The Passing Is Gradual

— BY H. H. CAMPBELL —

THE acid Bessemer process was invented in 1856, but the first results in the hands of practical iron masters were far from successful, and it was left to Bessemer himself, not only to find the cause of failure, but actually to build a works and prove the merit of his invention. It is this complete dominance of the situation that puts him head and shoulders above other claimants for the honor of bringing about a revolution in the art of making steel.

Between 1860 and 1865 rapid progress was made in Great Britain, and converters were started in Germany, France, Belgium, Austria and the United States. By 1870 the process was firmly established and during the next ten years there was a rapid increase in the production; but the nations of central Europe labored under a great handicap in being forced to send to Spain, Algeria and Elba to get ore which would give a suitable pig iron. So when in 1878 the basic Bessemer appeared on the scene, it was immediately put in operation in both Germany and Belgium and a few years later in France.

For a long time these three countries did not collect records showing how much metal was treated in the acid and how much in the basic vessel, so no figures can be given of the early history of acid Bessemer steel on the continent. From a general point of view, however, it may be said that after 1880 no new acid works were built in Germany, Austria, France or Belgium, although many existing works continued to operate, while some increased their rate of production, but to-day Russia is the only large producer on the continent. In Germany in 1913 only 1 per cent of the steel output was made in the acid converter; in France and Austria only 2 per cent. Belgium does not keep separate records for acid and basic steel, but it is known that most of the product comes from the basic converter. Great Britain and the United States lead in making acid Bessemer steel and it may be well to give a few facts about the development of the process in those two countries.

WANING OF BRITISH ORES

In 1870 Great Britain was first in the list of steel producers, this being natural because the Bessemer process was first operated there and because England alone of all the leading European nations possessed a large supply of pure ore; for on the West Coast near Barrow-in-Furness in the counties of Cumberland and Lancashire there are several beds varying from 50 to 68 per cent in iron and giving a pig iron containing about 0.04 per cent of phosphorus. Half a century ago there was no special demand for pure ore and there was only a limited output in this district; but after the advent of the Bessemer process the mines on the West Coast became very important. The ore was shipped to southern Wales and the pig iron to Sheffield and to foreign countries, thousands of tons coming to the United States, where it formed the basis of our early steel industry. Of course, these conditions created great activity in Cumberland and Lanca-

shire and the production of ore rapidly increased. In 1860 the output was 990,000 tons, while in 1870 it was 2,093,000 tons. The maximum was reached in 1882 when 3,136,000 tons was mined; but since then the output has decreased owing to the exhaustion of the mines, so that to-day it is only about half what it was 35 years ago.

BRITISH IMPORTS OF BESSEMER ORES

Before 1860 no foreign ore was brought into Great Britain and in 1870 only 400,000 tons was imported, which would account for less than 4 per cent of the total output of pig iron at that time. Imports have been steadily increasing ever since and in 1913 they amounted to 7,442,000 tons, which would account for over 38 per cent of all the pig iron produced. But leaving out of consideration all material high in phosphorus, we find that in 1870 only 15 per cent of the Bessemer pig iron produced in Great Britain was made from imported ores and 85 per cent from West Coast hematites; in 1882 the proportion was just half and half; while in 1913 Cumberland and Lancashire furnished only 24 per cent of the low-phosphorus ores used in the Kingdom, the remaining 76 per cent coming from abroad, most of it from Spain.

SPANISH ORES IN GREAT BRITAIN

As soon as the importance of the Bessemer process was realized, men turned to Spain for a supply of pure ore, because the deposits in the Province of Viscaya had been known to all the world for 20 centuries. It took a long time to develop a system of transportation and in 1870 every ton of ore was hauled from the mines in ox carts, while as late as 1881 over 700,000 tons was transported more than a mile over bad roads by this primitive conveyance. Even when tidewater was reached there were troubles, for only small vessels could cross the bar at the harbor of Bilbao, which was the chief shipping port. Political conditions were intolerable in Spain at that time and from 1872 to 1876 there was civil war, the city of Bilbao being besieged for five months.

Notwithstanding these difficulties, exports increased and in 1878 they amounted to 1,225,000 tons, three-quarters going to the British Isles. In 1913 Great Britain imported 4,714,000 tons of ore from Spain, which accounted for 60 per cent of the output of Bessemer pig iron. It should be said, however, that the greater portion of the iron made from Spanish ore is used in acid open-hearth furnaces, the West Coast hematites making a large proportion of the British acid Bessemer steel.

EARLY BESSEMER WORK IN THE UNITED STATES

Bessemer steel was made at Wyandotte, Mich., in 1864, and at Troy, N. Y., in 1865; but operations were not carried on regularly and commercially until after the Steelton plant was built in 1868, so that as late as 1870 the whole country made only 37,000 tons of Bessemer steel. It must be remembered, however, that while Europe was building converters, we were engaged in civil war and for

four years the destruction of capital and the loss of life in proportion to our wealth and population at that time were greater than the waste of money and of life in the European maelstrom to-day.

For a long time the pig iron used at Steelton was brought from the west coast of England and mixed with iron from Cornwall, Pa., but blast furnaces were built in 1872, which used a large proportion of anthracite as fuel and smelted the low-phosphorus magnetites of Cornwall, only 30 miles away, and a smaller amount from New Jersey. For many years every nook and corner of the earth was ransacked for suitable ore, and somewhere about 1884 the yard at Steelton contained at one time minerals from 26 different localities, including Pennsylvania, New Jersey, New York, Virginia, North Carolina, Spain, Algeria, Elba, Cuba, Ireland and the Grecian Archipelago, besides other places whose names have slipped away from recollection.

It may not be uninteresting to put on record that the Pennsylvania Steel Company started a chemical laboratory in 1869 and that it was in regular operation in 1870, with Andrew S. McCreath, now of Harrisburg, as chemist. This probably was the first fully equipped laboratory at any iron plant in the United States.

LAKE SUPERIOR ORES

All this time it was well known that there were vast iron deposits in Michigan, but transportation on the Lakes was crude and expensive, so that it was not until 1880 that as much as 2,000,000 tons of ore was mined on Lake Superior, while not until 1886

	Total Steel, Thousand Tons		Acid Bessemer, Thousand Tons		Per Cent of Total Output	
	United States	Great Britain	United States	Great Britain	United States	Great Britain
1880.....	1,247	1,375	1,074	1,034	86	75
1890.....	4,277	3,679	3,689	1,613	86	44
1900.....	10,188	5,001	6,685	1,254	66	25
1910.....	26,094	6,374	9,413	1,138	36	18
1913.....	31,301	7,664	9,546	1,049	30	14
1914.....	23,513	7,835	6,221	797	26	10
1915.....	32,151	8,351	8,287	821	26	10
Five year averages:						
1903 to 1907	19,036	5,572	10,267	1,286	54	23
1908 to 1913	27,256	6,635	9,313	1,033	34	16

*1908 and 1914 are omitted from these averages because these years were abnormal general financial conditions.

was 2,000,000 tons taken to Lake Erie. From that time to this the flood has been rising until in 1913 the output of Lake ores was 49,947,000 tons, which would make more pig iron than all the ore mined in Great Britain, Germany, France, Austria and Belgium combined.

Speaking roughly, about half of this ore will give a pig iron fit for the acid converter. In 1906 about 13,000,000 tons of Bessemer pig iron was made from Lake ores, which was more than half the total output of low-phosphorus iron in the whole world. In that year the United States made 12,276,000 tons of acid Bessemer steel, which is five times as much as has ever been made in one year either before or since by all the rest of the world put together.

DECREASE IN OUTPUT OF ACID BESSEMER STEEL

The accompanying table gives the production of acid Bessemer steel in Great Britain and the United States at different periods during the last half century. In Great Britain a maximum was reached about 1890 and the output has been decreasing ever since, there being a sharp decline in the last few years.

In the United States, on the other hand, there was a steady increase in production from the be-

ginning until 1906 when the maximum output was recorded. From that time there has been a tendency to increase the output of the open-hearth furnace and to push the converter into the background. It is not fair to draw conclusions from the record of any single year; so an average has been taken of two recent five-year periods, two abnormal years being omitted.

The first period runs from 1903 to 1907 and the second from 1909 to 1913. During this time the total steel output increased 43 per cent, but the production of Bessemer steel decreased 9 per cent. If any process is holding its own, it ought to make from year to year the same proportion of the total output, and measured by this standard the converter has been losing ground for many years, as shown by the table herewith, which gives the production of Bessemer steel in per cent of the total output during the last 15 years:

Production of Bessemer Steel in the United States in Per Cent of the Total Steel Output

	Per Cent		Per Cent		Per Cent
1901.....	65	1906.....	52	1911.....	34
1902.....	61	1907.....	50	1912.....	33
1903.....	59	1908.....	44	1913.....	30
1904.....	57	1909.....	39	1914.....	26
1905.....	55	1910.....	36	1915.....	26

Both the tables here given show that as the years go by the acid converter is making a constantly decreasing proportion of our steel and this is the yardstick we unconsciously use in measuring the relative importance of different processes. We say, for instance, that the basic open-hearth has supplanted the acid furnace, because basic furnaces in 1915 turned out 16 times as much steel as the acid hearths; and we rightly ignore the fact that the acid furnaces in that year produced three times as much metal as they did in 1890 when the basic furnace was just getting under way. Thirty years ago it was firmly believed by many that the old crucible process would be displaced by the open-hearth furnace, but in 1915 this country made twice as much crucible steel as in 1880 and more than three times as much as in 1875. This sounds rather strange until we say that in 1880 crucible steel formed over 5 per cent of our total output, while in 1915 it was only one-third of 1 per cent.

SURVIVALS

All around us are examples of what the naturalists would call "survivals." Thus, when the acid Bessemer process was developed half a century ago it was said that "the death knell of the puddling furnace had been sounded"; and a belated requiem was again sung over its grave when the basic open-hearth furnace came upon the scene. Yet the United States to-day is making twice as much wrought iron as it did in 1870.

We say that charcoal pig iron belongs to a bygone age; but the output of our charcoal blast furnaces in 1915 was nearly twice what it was at the time of our Civil War. The maximum was reached as late as 1890, when 628,000 tons was produced, this being twice as much as was made in 1854. The case, however, has a rather different aspect when we say that in 1854 the output of charcoal pig iron was 47 per cent of our total tonnage, while in 1915 only 1 per cent of our blast-furnace product was smelted with charcoal.

So in 1906 the United States produced 95,000 tons of charcoal blooms and as late as 1880 we made 36,000 tons direct from the ore in the old Catalan hearths, which possibly is as much as was made in Noricum and Catalonia in the days of Julius Caesar. Old methods die hard and no one

alive to-day will see the total abandonment of the acid converter. We cannot yet write the final chapter of its history; but we can say that it made possible our modern railroads, which could never have

reached their present development with wrought-iron rails. It created the Age of Steel and during the last half century has been one of the most potent factors in reconstructing our world.

Greatest Year in Iron and Steel Exports

Values, Including Machinery,
Were 180 Per Cent Above Those
for 1915—A Two-Years' Record

WASHINGTON, D. C., Aug. 8, 1916.—The fiscal year ended June 30, 1916, has made a record for exports of iron and steel that far overtops any previous fiscal twelvemonth in the history of the industry, according to the official statistics of the Bureau of Foreign and Domestic Commerce. The total shipments of iron and steel products on a basis of value rose fully 180 per cent over 1915 and more than 100 per cent over the high record of 1913. Tonnage commodities for the year 1916 exceeded by 143 per cent the figures for 1915 and by 93 per cent the record total for 1913. Shipments of machinery gained nearly 100 per cent over 1915 and 40 per cent over the high-water mark of 1913. Exports of machine tools for 1916 surpassed by 118 per cent the record for the corresponding period of 1915, which, in

1915, but declined 6 per cent as compared with the unprecedented total of May of this year.

The value of all shipments of iron and steel products in June, 1916, was \$76,257,884 as compared with \$31,757,103 for the same month of 1915 and \$18,927,958 for June, 1914. The highest previous record for exports of iron and steel was made in May of this year when the total was \$72,918,913. For the fiscal year 1916 the total was \$621,209,547 as compared with \$225,888,358 in 1915 and \$304,605,797 in 1913, the record fiscal year for iron and steel exports.

The exports of iron and steel, for which quantities are given, aggregate 527,542 gross tons in June, 1916, as compared with 355,829 tons for the same month of 1915. The record for these exports was made in May

Exports of Machinery for June and for Fiscal Years Ended June 30, 1915 and 1916

	June		Fiscal year	
	1915	1916	1915	1916
Adding machines	\$24,220	\$117,972	\$448,536	\$1,074,299
Air-compressing machinery	43,746	84,354	386,520	574,396
Brewers' machinery	21,992	106	124,769	28,726
Cash registers	138,275	129,676	1,371,053	1,144,350
Parts of	14,860	9,777	116,633	118,545
Cotton gins	3,612	3,876	45,048	65,721
Cream separators	25,288	32,636	214,632	488,984
Elevators and elevator machinery	56,506	127,054	808,973	1,494,411
Electric locomotives	71,218	17,681	324,478	454,544
Gas engines, stationary	28,311	21,214	419,819	352,299
Gasoline engines	407,271	1,565,383	4,339,316	11,898,531
Steam engines	139,992	185,727	2,710,782	13,501,320
All other engines	67,363	664,716	794,361	3,463,036
Parts of	382,098	866,222	2,956,103	7,273,523
Laundry machinery, power	19,681	35,070	277,019	295,018
All other	20,564	13,460	217,224	252,723
Lawn mowers	27,370	26,341	291,507	201,258
Metal-working machinery (including metal-working tools)	3,735,562	8,465,985	28,162,968	61,315,032
Meters, gas and water	20,648	32,045	300,072	290,499
Milling machinery, flour and grist	163,687	323,919	1,437,968	2,749,734
Mining machinery, oil well	102,354	148,456	1,889,347	1,332,246
All other	453,656	518,593	4,408,810	6,241,333
Paper-mill machinery	30,225	36,601	706,939	858,234
Printing presses	173,589	206,955	1,431,070	1,647,998
Pumps and pumping machinery	289,685	494,104	2,539,693	4,718,185
Refrigerating and ice-making machinery	68,920	31,591	636,664	686,918
Sewing machines	564,125	426,481	6,223,521	5,422,182
Shoe machinery	75,880	83,713	1,193,212	1,266,221
Sugar-mill machinery	169,738	397,801	2,092,016	5,987,491
Textile machinery	118,280	369,767	1,525,644	2,705,827
Typesetting machines	21,559	77,714	664,349	884,021
Typewriting machines	793,770	1,114,025	5,315,134	9,104,189
Windmills	62,892	105,888	709,697	1,087,964
Wood-working machinery, saw mill	30,268	31,135	316,814	360,688
All other	81,464	56,649	689,738	1,076,845
All other machinery and parts of	1,818,312	3,068,543	17,773,245	31,971,774
Total	\$10,266,981	\$20,541,139	\$93,863,694	\$182,677,065

turn, exceeded by more than 100 per cent any previous fiscal year.

The month of June, 1916, proves to be the banner month of an extraordinary year on a basis of the value of the exports of iron and steel products, although as compared with the phenomenal record of May there was a slight shrinkage in quantities. The total shipments of iron and steel during June gained 140 per cent in value over the same month of 1915 and 4½ per cent over the unbeaten total of May, 1916. Tonnage commodities in June gained 50 per cent over the same month a year ago, but declined 2.4 per cent as compared with May of this year. Exports of machinery rose 100 per cent as compared with June, 1915, but show a shrinkage of 6 per cent as compared with May of this year, when high-water mark was reached. Exports of machine tools gained 118 per cent over June,

of this year when the total was 540,591 gross tons. The total for the fiscal year 1916 was 4,862,154 gross tons as compared with 2,003,798 tons in 1915 and 3,008,498 tons in the record year of 1913.

EXPORTS OF MACHINERY

Exports of machinery in June, 1916, were valued at \$20,541,139 as compared with \$10,266,981 for the same month of 1915 and \$9,204,575 in June, 1914. Shipments of metal-working machinery aggregated \$8,465,985 as compared with \$3,735,562 for the same month a year ago, and \$9,935,806, the high record of May of the present year. Exports of machinery of all kinds for the fiscal year 1916 were valued at \$182,677,065 as compared with \$93,863,694 in 1915 and \$130,554,379, the record total, in 1913.

Details of the exports of machinery for June, 1915,

and June, 1916, and for the two fiscal years are given in the preceding table.

EXPORTS OF TONNAGE IRON AND STEEL

The following table shows the exports of tonnage iron and steel in June and for the fiscal year ended June, 1916, as compared with 1915, all in gross tons:

	June		Fiscal Year	
	1915	1916	1915	1916
Pig iron.....	22,111	48,770	130,594	286,399
Scrap.....	7,280	15,867	29,830	154,709
Bar iron.....	2,273	6,056	12,345	70,519
Wire rods.....	18,137	18,045	98,441	171,528
Steel bars.....	58,453	61,017	232,953	625,138
Billets, ingots, etc.....	48,999	116,425	220,416	962,228
Bolts and nuts.....	1,453	2,156	13,486	30,844
Hoops and bands.....	2,009	4,007	15,097	41,256
Horseshoes.....	2,956	1,369	13,017	13,126
Cut nails.....	416	372	2,643	4,420
Railroad spikes.....	603	2,099	5,487	26,405
Wire nails.....	10,181	17,187	55,472	128,762
All other nails, including tacks.....	1,266	1,067	5,455	9,634
Cast-iron pipes and fittings.....	5,056	5,879	62,390	52,617
Wrought pipes and fittings.....	15,064	12,161	117,695	125,628
Radiators and cast-iron house heating boilers.....	206	193	2,669	2,263
Steel rails.....	34,547	49,772	156,587	541,810
Galvanized iron sheets and plates.....	9,913	9,904	54,955	79,400
All other iron sheets and plates.....	1,239	4,048	9,526	42,631
Steel plates.....	22,530	18,662	124,611	271,280
Steel sheets.....	8,973	9,969	96,322	98,456
Structural iron and steel.....	22,812	25,034	168,624	276,866
Tin and terne plates.....	8,024	29,751	80,456	230,473
Barb wire.....	22,787	37,499	147,591	364,244
All other wire.....	28,536	30,333	147,136	251,518
Total.....	355,829	527,542	2,003,798	4,862,154

TWO YEARS' EXPORTS OF IRON AND STEEL AND MACHINERY

Inasmuch as the past two fiscal years coincide almost exactly with the period of the European war the following table, showing the export movement of iron and steel products by months, will be of special interest:

1914	Total Values	Tonnage		Machine Tools
		Iron and Steel, Gross Tons	Total Machinery	
July.....	\$16,737,552	114,790	\$8,060,614	\$810,247
Aug.....	10,425,817	86,598	4,759,663	298,259
Sept.....	12,531,102	96,482	5,295,167	550,106
Oct.....	16,455,832	147,293	6,623,539	2,110,397
Nov.....	15,689,401	140,752	6,204,927	1,871,171
Dec.....	14,939,613	116,816	6,372,041	2,432,331
1915				
Jan.....	18,053,421	139,789	7,676,078	2,903,740
Feb.....	16,470,751	144,553	7,936,467	2,523,722
March.....	20,551,137	174,269	10,053,895	3,863,913
April.....	20,639,569	223,242	10,399,716	3,300,953
May.....	26,536,612	262,755	10,214,062	3,762,567
June.....	31,757,103	355,829	10,266,981	3,735,562
July.....	35,891,575	368,893	11,412,623	3,872,358
Aug.....	37,726,822	401,298	11,439,391	3,624,411
Sept.....	38,415,180	381,317	12,277,389	3,256,973
Oct.....	43,602,741	351,128	15,239,415	3,236,079
Nov.....	48,056,220	362,765	15,838,119	4,644,713
Dec.....	45,825,277	354,109	13,328,450	3,205,788
1916				
Jan.....	51,643,807	357,121	14,324,426	3,249,595
Feb.....	54,155,386	368,820	13,945,347	4,662,905
March.....	58,300,297	438,150	16,243,981	6,501,022
April.....	58,722,411	384,920	17,526,899	6,552,397
May.....	72,918,913	540,591	21,984,961	9,935,806
June.....	76,257,884	527,542	20,541,139	8,465,985

IMPORTS OF IRON AND STEEL

Imports of tonnage iron and steel in June amounted to 26,888 gross tons as compared with 31,610 tons for the same month of 1915. Imports for the fiscal year 1916 were 309,051 gross tons as against 251,251 tons for the same period of 1915. The following table shows the imports of tonnage commodities for June and for the fiscal year 1916 as compared with 1915, all in gross tons:

	June		Fiscal Year	
	1915	1916	1915	1916
Ferrosilicon.....	386	536	6,608	5,469
All other pig iron.....	9,895	13,360	103,755	112,718
Scrap.....	2,833	3,868	32,667	96,012
Bar iron.....	664	1,251	10,284	8,241
Structural iron and steel.....	14	279	5,539	1,581
Hoop and band iron.....	1	648	1	1
Steel billets without alloys.....	1	254	1,777	11,325
All other steel billets.....	127	1,953	22,764	12,630
Steel rails.....	17,046	4,711	52,092	53,944
Sheets and plates.....	101	91	2,565	1,709
Tin and terne plates.....	75	91	4,751	802
Wire rods.....	468	494	4,801	4,619
Total.....	31,610	26,888	251,251	309,051

It should not be assumed that because the export statistics for June of this year show a decline in tonnage commodities and in the value of machinery that

the peak of the war export movement has been reached. This may or may not be true. War orders undoubtedly are declining in volume, but deliveries are still increasing and the shrinkage in June as compared with May is attributed by experts here entirely to freight embargoes and to the impossibility of securing adequate ocean transportation.

W. L. C.

Nitric Acid and Nitrates from Blast-Furnace Slags

Referring to the efforts made from time to time to utilize blast-furnace slags, with little material outcome apart from slag wool and cement, E. Kilburn Scott of London says that the time has arrived for pig-iron makers to consider the problem seriously. In a paper in the *Journal of the West of Scotland Iron and Steel Institute* on "Synthetic Nitric Acid in Connection with the Utilization of Slags and Waste Gases," Mr. Kilburn offers the following proposal:

The scheme is primarily intended to utilize the aluminous blast-furnace slag of the Cleveland district, but it only needs slight modification to deal with slags of other districts. Aluminous blast-furnace slag contains about 33 per cent of lime and 25 to 27 per cent of alumina, and when just tapped from the furnace it also contains a large amount of heat.

The problem of utilizing this heat has already been solved. In 1914 W. L. Johnson read a paper before the Iron and Steel Institute giving details of a method used at Bell Bros. Works, Port Clarence, by which 1017 lb. of steam was produced per ton of slag. After deducting 6.6 per cent for escape with the incondensable gases and allowing another 10 per cent loss, he estimated that there was 855 lb. of clean steam available per ton of slag. Assuming 27 lb. of steam per horsepower with a vacuum of 28½ in., a modern exhaust steam turbine should therefore give 31.6 hp. per hour per ton of slag per hour.

Of course the energy could be sold to a power company or utilized in other ways, but we feel most strongly that the best way to utilize it is to make nitric acid from the air by the direct electric process. We specially advise this because with the nitric acid so produced the slag can be still further utilized.

One interesting feature in the process of raising steam from slag is that it becomes granulated, and this makes it very easy to be acted on by nitric acid. The result of such action is a mixed nitric solution, chiefly of alumina and lime. After a separation from silica, the alumina in the solution can be precipitated by milk of lime, and when purified by known methods is ready for use for the manufacture of aluminum. At the same time the acid used in dissolving the slag is obtained as calcium nitrate, and after treatment to reduce its hygroscopic properties it becomes a rich fertilizer. The gelatinous silica obtained from the treatment of the slag may be added to act as a useful diluent.

Electric and Crucible Steels in Germany

The production of electric and crucible steels in Germany, as affected by the war, presents an interesting contrast. The following table presents the official figures in metric tons for various periods:

	Electric Steel, Per Month	Crucible Steel, Per Month
August, 1914.....	2,810	8,124
1913.....	8,479	8,264
1914.....	7,445	7,924
1915.....	10,804	8,337
January to June, 1916, five months	14,075	8,780

The increase in the output of electric steel to a present rate per month of five times what it was when the war broke out is in decided contrast with the crucible steel output which at present is not greatly in excess of the rate in 1913.

Lignite as a fuel in an electric station has given highly economical results according to *Engineering* of June 30. At the Weiswiller station, near Acken, Germany, lignite of about 2700 B.t.u. per pound, and with 64 per cent moisture is burned directly on the boiler grates. About 4 kg. or 8.8 lb. of lignite are used per kilowatt-hour generated. Ten tons of lignite is valued at 10.85 marks so that the fuel cost on this basis works out at about 0.1 cent per kilowatt-hour. Other charges amount to 0.135 cent per kilowatt-hour, making the cost of electric energy roughly 0.2 cent per kilowatt-hour.

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THE IRON AGE

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Capital Tied Up in Steel

When manufacturers who commonly discount their bills become payers of interest on their material accounts, it is reasonable to conclude that their capital is well engaged. A diminished margin of profit may be an explanation, particularly if it has proved impossible to bring up prices of manufactured articles as rapidly as some of the major raw materials have advanced. But the situation is very largely due to the temporary exhaustion of liquid capital because of the larger investment in materials. The effect is cumulative all along the line, and many buyers find it difficult to keep out of the slow pay class. Some few appear as willing to buy credit from the seller as from the banker, from whom, indeed, they may also have borrowed.

For some time it has seemed clear that a good many manufacturing consumers of iron and steel have gathered ample stocks of raw materials. In the early part of the second quarter of this year and just before, there was a rush to cover. This was not only for normal demands for the late months but for an extra amount which conditions indicated might be moved, and also to secure protection against the price advances, which were then quite uncertain. Though the quantities of material awaiting manufacture may be only the normal, the amount of money tied up is often nearly double the normal. Commitments involved in the far-forward specifications of the excited buying period tend at times to aggravate the situation. Deliveries against these may be made when least expected and for what is not in immediate demand, and on top of it all high prices check general buying by manufacturing consumers. There have been cases lately in which consumers with comfortable stocks have asked the mills to delay shipment, thus to minimize obligations. Meanwhile, the mills interpose no objection, as the export demand is so heavy and so broad as to give work to practically every steel producer.

It is thus a situation in which with his forced stock accumulation and its capital charge, the average consumer limits his present specifications as much as possible. He has shared in the general belief, obtaining up to this week, that contract steel prices were not likely to go higher, and is apparently not yet convinced that the volume of offerings from the other side is sufficient to cause fresh advances.

At the same time there is evidence that Europe wants more steel for early delivery than the mills can entertain, at least if they reserve the average amount for estimated domestic wants. But until home consumers are moved again by fear of further advances, as in the early months of the year, and can discover signs of a better demand from their own customers, it is not likely they will call for the maximum amounts on their steel contracts, with all that these would involve in additional financing.

Meanwhile, on the more complicated question of providing for what they will need in the first half of 1917, they are willing to let events shed more light.

Steel a Product of Pig Iron

While a statement that steel is made from pig iron may appear to refer to a quite elementary fact, it should be observed that a not uncommon view is that open-hearth steel is made from scrap and pig iron. There is a large production of works scrap, chiefly by cropping, and it has been said that if a method were adopted whereby a sound steel ingot would be produced, necessitating a crop of not more than 5 per cent, the duplex steel-making process would come at once into general vogue.

The tonnage relation between the production of steel-making pig iron and finished steel products is closer, perhaps, than is generally realized. The following table shows for the past four years the reported production in the United States of Bessemer, low-phosphorus and basic pig iron and ferromanganese and spiegeleisen, together with the production of steel castings and of finished rolled steel, in the form in which reported, with the difference:

Production of Pig Iron and Finished Steel (Including Castings)—Gross Tons

	Pig Iron	Steel	Difference
1912	23,303,625	23,985,880	*682,255
1913	24,356,639	24,133,730	†222,909
1914	17,715,832	17,895,666	*179,834
1915	23,843,477	23,964,915	*121,438
Four years ...	89,219,573	89,980,191	*760,618

*Excess of steel. †Excess of pig iron.

Thus in four years the net excess of steel castings and rolled steel over the production of steel-making pig iron was three-quarters of a million tons in ninety millions, the exact proportion being 0.85

per cent. Of course the comparison is not precisely accurate, because limited portions of the iron included above find their way to the iron foundry, and because there are imports and exports. These factors, however, are practically insignificant. No allowance is to be made for the fairly large amount of Bessemer iron used in the manufacture of ingot molds, because when the molds become useless as such they are broken up and charged to the Bessemer cupola or the open-hearth furnace.

Despite this close agreement between steel-making pig iron and finished steel, the following excess of steel ingots over rolled steel have been reported:

	Gross Tons
1912	7,265,423
1913	7,167,144
1914	5,617,364
1915	8,186,121

Four years 28,236,052

This excess of 28,236,052 tons occurred in the production of 66,432,756 tons of finished rolled steel, the excess being 32.7 per cent. Conversely, the apparent loss from the ingot to the merchantable steel was 24.6 per cent of the weight of ingots reported.

The use of scrap arising outside the steel works does a great deal more, of course, than furnish the 190,000 tons a year excess of steel over pig iron. There is a loss of nearly all the metalloids contained in the pig iron, also a loss of iron in slag, and a loss to the steel works in scale, for the scale goes to the blast furnace. Less than half a million tons, probably, is furnished by the iron ore used in the open-hearth furnace. An exact analysis of the situation cannot be made, for the reason that there are no accurate data on the production of scale. The major part of the loss in weight from ingot to merchantable steel is in works scrap, however, and as there is necessarily old material to be used, as well as scrap produced in the fabrication of steel as sold by the steel mills, it is evident that a material reduction in the amount of cropping required to produce sound steel would totally disarrange the alignment as to scrap, and a general modification of practice, such as by the adoption of the duplex process, would be dictated. In 1915 only 7.5 per cent of the basic open-hearth steel produced was by the duplex process.

Galvanized Sheets and Tin Plates

Some surprise may be felt at the volume of production of galvanized sheets just reported for 1915, seeing that the high price of spelter caused a great decrease in galvanizing operations during the year; but it must be remembered that the slump in galvanized sheet production rate came late in the year, and followed by quite an interval the sharp rise in spelter. The high point in spelter was reached early in June, the spot market being above 25 cents for about a week, but at that time the mills had a very considerable volume of business on books, business on which some of them lost a great deal of money as they had not adequately covered themselves on spelter. Indeed, the experience at that time no doubt had a great deal to do with developing the sentiment in favor of a movement to make contracts binding in the sheet trade, as the sales

contracts would not have been binding in case of a decline in galvanized sheets while the mills would have been forced to take the spelter purchased against them.

The production of galvanized sheets and of formed products, stamped first and then galvanized, has been as follows in the three years for which statistics are available, the figures representing gross tons:

	1913	1914	1915
Sheets	824,047	806,994	706,058
Formed products.	57,674	58,752	50,119
Total	881,721	865,746	756,177

Thus there was a decline of 29 per cent. in the production of galvanized sheet products from 1913 to 1915, the statistics for 1914 being of no particular significance, as that was an off year. The production of sheets, thirteen gage and lighter, exclusive of black plate specialties and black plates for tinning, was: 1913, 1,464,631 gross tons; 1914, 1,302,355 tons; 1915, 1,676,577 tons, a material increase being thus shown. If from the black sheet production a deduction be made for the sheets galvanized, the production of black sheets not galvanized appears to have been about 650,000 gross tons in 1913 and about 975,000 gross tons in 1915, representing an increase of about 50 per cent. Compared with that increase, the 29 per cent. decrease in galvanized products is indeed striking.

Tin plate made a new production record in 1915, with an output of 72,978 gross tons ofterne plate and 982,958 tons of tin plate, a total of 1,055,936 gross tons of tin and terne plate. The previous record had been made as far back as in 1912, with 962,971 tons, and thus the advance in production in recent years has really not been very large. As tin-plate production fluctuates so much from season to season comparisons can best be made by averages. The average production in the four years 1912 to 1915 inclusive was 893,000 gross tons, while the average in the four years 1902 to 1905, ten years earlier, was 448,000 tons, so that there was almost exactly a doubling in ten years.

The gain in tin-plate production in 1915 over 1912 was attained largely on account of the heavier exports, which amounted to 81,694 tons in 1912 and to 154,541 tons in 1915. If the average shown for the first five months of this year is maintained, the year's exports should be about 250,000 tons. Exports will doubtless be at a restricted rate this summer but late in the year the loss should be made up and it is not improbable that this year's production will exceed one and a quarter million gross tons. It was not until 1902 that the production of structural shapes reached such a tonnage and in three years since then it has fallen below the amount. Tin plate has made its place among the tonnage items of the steel industry.

Insect Pests in Factories

The fly, the mosquito and other insects which are either known to be carriers of disease or are under suspicion as such, and which in all respects are nuisances, have not been given as serious consideration as they deserve in connection with the health and comfort of persons employed in manu-

facturing establishments. Exception may be made of cases where protection from insects was absolutely necessary, or where owners thought it worth the trouble to be rid of the pests even though they might have been tolerated. Epidemics such as that of the prevalent infantile paralysis cause emphasis to be given to the menace of flies, since they are known to be carriers of some diseases and are suspected of being active agents of distribution of this baneful malady.

In certain malarial districts factory owners have gone to much trouble and expense in excluding mosquitoes and in ridding the adjacent country of their breeding places, and similar measures have been taken where mosquitoes are of a less dangerous species. These precautions are especially important where night shifts are employed, for a workman cannot give to his task his undivided attention if mosquitoes are hovering round him, and when he is uncomfortable he is not only fretful but he is less efficient. The results of a plague of flies are much the same; the infested workroom is an undesirable place, and, according to experts, the possibility of a spread of disease is strong, especially in factories where young people are employed.

It is pointed out that much good can be accomplished by scrupulous care in keeping factories and their surroundings free from everything that might attract insects, such as refuse from workmen's food. Efforts should be made by owners to secure the co-operation of their employees, and, where sources of trouble are found in the carelessness of neighbors, health officers should be stimulated to energy in their efforts to secure better conditions. Ill-kept stables, the slovenly use of yards and streets, unhygienic methods of garbage disposal and other similar evils should not be overlooked by factory owners. It is as highly important to have our factories free from all insect pests as engineering operations in the tropics. Yet we hear much of what has been accomplished in regard to the latter while too often neglect prevails near home.

CORRESPONDENCE

Price Adjustment of Iron Ores

To the Editor: The adjustment of iron ore prices because of increase or decrease in iron content from the guaranteed percentage has been an accepted factor in the purchase of ores for years. In fact, it has been customary since the beginning of the industry. The current method of calculating average analyses upon which to base such adjustments has long been in use. It is the purpose of this article to demonstrate that this method, which for years has been accepted unquestioningly by both buyers and sellers of iron ore, is a fallacious one.

The method now in use by the sellers of ore from the Lake Superior district may be reduced to the following formulae:

1.
$$\frac{(\text{Tons ore} \times \% \text{ of iron}) + (\text{tons ore} \times \% \text{ iron}) + \text{etc.}}{\text{Total tons}}$$
 = average iron.
2.
$$\frac{(\text{Tons ore} \times \% \text{ moisture}) + (\text{tons ore} \times \% \text{ moisture}) + \text{etc.}}{\text{Total tons}}$$
 = average moisture.
3.
$$(\text{Average iron}) \times (100\% \text{ less average moisture}) = \text{average iron (natural)}.$$

The price adjustment is then based upon the result of formula 3.

This procedure that has been in force for a great many years seems correct on first consideration. Let us, however, analyze these formulae:

In formula 1 the tonnage used ("tons ore") is the actual weight of the ore as it is shipped, which is in the natural state, with moisture included. The iron content ("% iron") is the percentage of iron in the ore, dried at 212 deg. Fahr. The ore vendors, therefore, multiply "natural ore" by "dry iron" and call the product "units of iron." This procedure is followed for each succeeding cargo of ore, and the sum of the units thus obtained is divided by the total tonnage of ore. The result is called the average percentage of iron in the ore, dried at 212 deg. Fahr. Thus we see that the figure represented by the term "units of iron" is hybrid, being a mixture of *dry* and *natural* figures.

Formula 1, therefore, is both mathematically and metallurgically incorrect, and has been so characterized by Dr. Rukard Hurd, a recognized authority on iron ores and secretary of the Minnesota Tax Commission.

Formula 2 is undoubtedly correct, as the moisture determination must be made with the ore in its natural state.

Formula 3 is so familiar as to need no explanation; mathematically it is unquestionable.

The question, then, hinges upon the validity of formula 1, and the above analysis, showing the peculiar combination of *dry* and *natural* figures, seems to prove that it is fallacious.

To remedy this erroneous method the logical procedure is to calculate the iron in the natural state for each cargo of ore according to the usual method, as shown:

$$(\% \text{ Iron dry}) \times (100\% - \% \text{ moisture}) = \% \text{ Iron natural.}$$

The various cargo tonnages should then be multiplied, each by its percentage of iron *natural*. The sum of the "units" thus obtained, when divided by the total tonnage of ore, will give an absolutely correct average of the iron in the ore in the *natural state*.

A small ore purchase, totaling 40,000 tons, when figured according to both the usual method and the one here proposed, showed a loss to the vendor amounting to \$66.32, due to the use of this old, fallacious method. When we remember that the expected shipment from the Lake Superior district has been set at 60,000,000 tons for the 1916 season, the question assumes serious proportions.

Of course, in another case, the error might swing in the other direction, but the contention is that if a process is proven to be incorrect, it is illogical to continue its use.

The above demonstration was laid before the Lake Superior Iron Ore Association in May, 1915, but no change has yet been announced by that body. The writer therefore takes this means of bringing his contention before the ore vendors and consumers of the country, and will welcome any question or comment which this article may bring forth.

JAMES B. SPRAGUE,

Pittsburgh, Pa., Aug. 5, 1916.

That a corps of trained women workers in medical, social and domestic lines was put to work in the coal and iron mining camps and the steel plant of the Colorado Fuel & Iron Company Aug. 1 is announced in the last issue of the company's *Industrial Bulletin*. The system, which is to be extended widely throughout the properties of the corporation, is due to the combined action of the Colorado Fuel & Iron Company, the Y. M. C. A. and John D. Rockefeller, Jr. To begin with, five women workers, each an expert, are in the field. Of these two are assigned to the steel works community, one as a nurse and social worker and the other as a playgrounds teacher for the children of steel workers.

For America's Electrical Week, Dec. 2-9, planned by the Society for Electrical Development, 29 West Thirtieth Street, New York, local committees have been organized in 286 cities.

Production of Miscellaneous Products in United States in 1915

The American Iron and Steel Institute, 61 Broadway, New York, presents in its special statistical bulletin No. 4 (1916) the following statistics of the production of certain iron and steel products in this country which were not included in the statistical statement published in THE IRON AGE of July 20:

Production of Tinplates and Terne Plates, 1910-1915			
Years	Tinplates	Terne Plates	Total Pounds
1910	1,450,821,000	168,184,000	1,619,005,000
1911	1,597,629,000	158,441,000	1,756,070,000
1912	1,965,659,000	191,396,000	2,157,055,000
1913	1,708,186,000	136,944,000	1,845,130,000
1914	1,939,785,000	146,195,000	2,085,980,000
1915	2,201,825,054	163,470,646	2,365,295,700

Production of Galvanized Sheets			
Products	1914—Pounds—		
	Iron	Steel	Total
Galvanized sheets	91,235,731	1,716,431,398	1,807,667,129
Galvanized formed products*	3,879,072	127,724,537	131,603,609
Total	95,114,803	1,844,155,935	1,939,270,738
Products	1915—Pounds—		
	Iron	Steel	Total
Galvanized sheets	32,614,505	1,548,954,701	1,581,569,206
Galvanized formed products*	1,115,440	111,152,350	112,267,790
Total	33,729,945	1,660,107,051	1,693,836,996

*Articles formed or stamped from iron or steel black plates or black sheets and galvanized after the completion of the forming or stamping process.

Production of Rail Joints and Fastenings, 1914-1915						
Articles	1914—Gross			1915—Gross		
	Iron	Steel	Tons Total	Iron	Steel	Tons Total
Angle splice bars	3,854	82,921	86,775	2,937	116,721	119,658
Tie-plates	30,563	157,595	197,158	43,606	239,903	283,509
Fish plates	393	29,314	29,707	88	10,748	10,836
Other rail joints	110	58,792	58,902	300	56,421	56,721
Total	43,920	328,622	372,542	46,931	423,793	470,724

The production of seamless steel tubes in 1915 amounted to 139,668 gross tons, against 90,595 tons in 1914, an increase of 49,073 tons, or 54.2 per cent. Of

Production of Pipes and Tubes						
Kinds of pipe	1914—Gross Tons—			1915—Gross Tons—		
	Iron	Steel	Total	Iron	Steel	Total
Black, standard	102,244	562,263	664,507	112,470	711,297	823,767
Galvanized	31,896	233,133	265,029	21,702	253,242	280,944
Oil country goods	50,824	568,467	619,291	39,753	563,167	602,920
O. D. and misc.	343	111,042	111,385	108	115,005	115,113
Boiler tubes	26,840	50,652	77,492	26,480	70,450	96,930
Total	212,147	1,525,557	1,737,704	206,513	1,713,161	1,919,674

Production of Cast-Iron Pipe, 1914-1915						
Kinds of Pipe	1914—Net Tons—			1915—Net Tons—		
	Pipe	Fittings	Total	Pipe	Fittings	Total
Gas and water*	891,646	46,651	938,297	911,901	44,471	956,372
Soil and plumbers'	164,866	57,617	222,483	184,869	73,629	258,498
Total	1,056,512	104,268	1,160,780	1,096,770	118,100	1,214,870

*Includes culvert pipe. Manufacturers able to separate their production report 18,900 tons of culvert pipe in 1914 and 25,140 tons in 1915.

the total in 1915, 63,488 tons were hot-finished and 76,180 tons were cold-drawn, against 36,939 tons of hot-finished and 53,656 tons of cold-drawn tubes in 1914.

Production of Wire Nails—Kegs of 100 Lb.			
Years	Production	Exports	Consumption
1910	12,704,902	960,295	11,744,607
1911	13,437,778	1,200,957	12,236,821
1912	14,659,700	1,530,353	13,129,347
1913	13,559,727	977,477	12,582,250
1914	13,132,814	809,167	12,323,647
1915	14,583,026	2,051,475	12,531,551

Production of Cut Nails—Kegs of 100 Lb.			
Years	Production	Exports	Consumption
1910	1,005,233	182,087	823,146
1911	967,636	255,854	711,782
1912	978,415	208,568	769,847
1913	842,038	84,885	757,153
1914	769,665	76,676	692,989
1915	775,327	94,878	680,449

Horseshoe nails, cut tacks, wire nails, or railroad or other forged iron or steel spikes are not included.

Limited Freight and Baggage Liability

WASHINGTON, D. C., Aug. 8, 1916.—The so-called Cummins amendment to the interstate commerce law, approved March 4, 1915, which has occasioned endless annoyance and confusion to shippers and travelers, has just been comprehensively amended by a Senate bill which passed the House Aug. 2 and has been approved by the President. The action of Congress has been taken in response to the overwhelming demand from all parts of the country and it is an interesting fact that not a single adverse vote was recorded against the amendatory measure either in committee or on the floor of either house. The Cummins amendment was adopted as a proviso to the Carmack act, which was intended to prevent the railroads from limiting their liability for the loss or damage of merchandise by special contract. Its text was as follows:

Provided, however, that if the goods are hidden from view by wrapping, boxing, or other means, and the carrier is not notified as to the character of the goods, the carrier may require the shipper to specifically state in writing the value of the goods, and the carrier shall not be liable beyond the amount so specifically stated, in which case the Interstate Commerce Commission may establish and maintain rates for transportation, dependent upon the value of the property shipped as specifically stated in writing by the shipper. Such rates shall be published, as are other rate schedules.

Immediately after the enactment of this amendment it was pointed out by the Interstate Commerce Commission that it would nullify the rules of the commission under which many kinds of merchandise have been specially listed and on which rates have been made dependent on the value of the goods. The commission also held that the Cummins amendment by its plain terms must apply to passengers' baggage. Thus all passengers during the past 15 months have been obliged to certify in writing to the value of each piece of baggage before it could be checked. Commercial travelers especially have suffered great annoyance.

With a view to amending the law to obviate these difficulties the Senate Committee on Interstate Commerce, early in the present session, drafted an amend-

ment to the Carmack act, substituting for the Cummins amendment one to the effect that the provisions of the act respecting liability for full actual loss, damage, or injury, notwithstanding any limitation of liability or release as to value, shall not apply to baggage carried on passenger trains or boats, or to property, except ordinary live stock, received for transportation, concerning which the carrier shall have been or shall hereafter be expressly authorized or required by order of the Interstate Commerce Commission to establish and maintain rates dependent upon the value declared in writing by the shipper or agreed upon in writing as the released value of the property.

The new statute takes effect immediately, its first result being the abolition of the certificate of value of passengers' baggage.

W. L. C.

The California Industrial Accident Commission is publishing new rules governing the use of safety appliances on boilers, to take effect Jan. 1, 1917. Tentative rules were published some time ago, as a basis for public hearings in July.

MODERN SHOP MANAGEMENT

Some Preliminary Steps in Introducing It—One Need of Job Analysis Shown

A paper on scientific management was presented recently before the National Gas Engine Association at Chicago by Prof. J. A. Bursley, associate professor of mechanical engineering at the University of Michigan, Ann Arbor, Mich. From this paper the following notes have been taken:

SOME PRELIMINARY STEPS

In case it is decided to go ahead, there are certain preparatory steps which must be taken. The first of these is to obtain, if possible, a record of what has been done in the past so that after the new system has been started we may have something with which to compare the results obtained. In a large majority of shops it will be found that there is an almost total absence of records that are of any value. There has been no system of cost-keeping that really means anything. The chances are ten to one that all the management knows is that on the gross business done in any one year there has been a profit or a loss; but when it comes to the question as to which particular line of goods manufactured has shown a profit and which a loss, or why there is a loss, most concerns are absolutely at sea.

After obtaining such records of existing practice and conditions as we can, the next step will be a re-arrangement of the plant to utilize better the space available and make possible more efficient and economical operation. This step must be very carefully thought out and all contingencies provided for as far as possible, before any actual changes are made. In order to minimize the confusion resulting during this reconstruction period, it is advisable not to try to do everything at once, but to proceed gradually with the changes, having a definite goal in mind, however, and making each step lead toward the final arrangement which we have previously planned out. In this connection, it is sometimes desirable to build a small model of the plant or simply lay out a drawing to scale, and then locate on each floor the various machines by pieces of cardboard cut to scale. The paths followed by the raw materials and manufactured products passing through the plant may be indicated by strings or ink lines of various colors. It will then be very easy to detect cross tracks, back paths, etc., and to remedy such devious courses by a rearrangement of the cardboard machines.

One of the first things to be decided in the rearrangement of the plant is the location of store-room, tool-room and planning-room. In most cases, unless the plant is very large or the raw material of peculiar character, it is advisable to have all stores in one place. Such a plan will make control of the stores easier. If the store-room for finished product can be placed near the raw material store-room, so much the better. The tool-room and planning-room should be as centrally located as possible to make them easily accessible to all employees.

The next step is to clean house. Nearly every plant which has been running any length of time has an accumulation of scrap and junk which, like Topsy, has "just growed" until it has become a fixture and it has been nobody's duty to dispose of it. This accumulation of years should be gone over by someone familiar with the plant in question and the part worth keeping carefully separated from the rest. There will probably be opposition on the part of the workmen when this cleaning-up process takes place as each one has carefully collected a set of the tools which he uses most frequently, and he feels that he has a sort of proprietary claim on them and he objects to having them returned to a central tool-room where they will be accessible to everyone.

STORES A FORM OF MONEY

It is important to remember, and it should be impressed upon all employees, that stores are simply an-

other form of money and that it is just as necessary and vital to the financial success of the business to have a correct and accurate control and record of stores as it is of the cash drawer. There is no more reason why the store-room should be open so that anyone may take out material when he pleases than there is that anybody should have the right to put his hand in the cash drawer and take out what money he wants.

A SHOWING UP OF FAULTY CONDITIONS

In a shop (not running under scientific management) manufacturing automobile windshields, one of the operations consisted in turning and threading certain small brackets. Part of these were turned on a two-spindle bar machine and threaded on another machine, while others were both turned and threaded on a turret lathe. The management wished to know which of these two ways was better; that is, by which way the cost per piece was cheaper. An analysis and time-study of both operations showed the following:

The setting-up time for the two-spindle machine was 46.33 min., while that for the turret lathe was 84.33 min. A study of the data, however, revealed the fact that at least 32.46 min., or nearly 40 per cent, of the latter time might have been saved by proper planning and without the slightest change whatever in the method of operation or in the speed of the operator. The items going to make up this lost time were:

1. Getting wrench and parts for new set-up.....	1.08 min.
2. Getting a hammer.....	0.95 min.
3. Cleaning bearing on fixture.....	4.14 min.
4. Cleaning oil grooves in rest.....	1.68 min.
5. Getting tin snips and cutting liners.....	1.64 min.
6. Recutting thread on fixture stud.....	3.58 min.
7. Grinding clamp to fit.....	0.75 min.
8. Making shim to put back of stock.....	0.90 min.
9. Hunting for file to clean die cutters.....	0.77 min.
10. Cleaning dies with file.....	0.61 min.
11. Cleaning dies with rag.....	1.45 min.
12. Getting new dies.....	1.32 min.
13. Tying up feed handle with block and rope.....	2.02 min.
14. Getting thread gage.....	11.59 min.
Total	32.46 min.

The psychological affect of conditions which permit and even necessitate such a loss of time are extremely bad. No workman will do his best when he finds it necessary to spend 10 to 15 min. looking for tools and then 15 to 20 min. more cleaning a dirty machine and getting it into workable shape by cutting shims, cutting new threads on fixture studs and tying the machine up so that it will run. The machine should have been clean, and in good repair, and all the necessary tools and liners should have been at the machine ready to be used.

When these 32.46 min. are subtracted from the total setting-up time on the turret lathe, 84.33 min., it leaves 51.87 min. as compared with 46.43 min. on the bolt cutter.

Now let us compare the actual machine and handling times. The total time per piece on the bolt cutter was 1.44 min. per piece as against 0.93 min. on the turret lathe, and this is on the basis of both spindles on the bolt cutter being operated simultaneously. At this rate it does not take long for the turret lathe to overcome the slight advantage in setting-up time held by the bolt cutter. The fact that the bolt cutter was not running anywhere near its proper speed was noted by comparing the actual cutting times. The time required to turn one end (47/64 in. in diameter and 2 1/4 in. run) was 1.51 min. on the bolt cutter and only 0.19 min. on the turret lathe.

PAYING BONUS EARNINGS PROMPTLY

The particular method of pay used is really of minor significance so far as results are obtained, although unfortunately it has been magnified in importance by those opposed to scientific management. If the men feel that they are getting a square deal, and the production is under proper control, the tasks will be accomplished and the work turned out, though the pay be based on a piece-rate system, task and bonus, premium system or any other. Control of material and confidence of employee are the keys to increased productivity.

One other point to be emphasized in this connection is this: in using any kind of bonus or premium system,

the sooner the men can be given the bonus after it is earned, the better it will be. If a man is going to get his bonus the next day or at the end of the week, he will work for it; but if it is not going to come until the end of the month or until the end of the year, he forgets about it and loses interest—he does not care anything about it. He wants his reward as soon as possible after it has been earned. In most shops working under this system, every man is given a ticket each morning informing him what his earnings were for the previous day.

Patching Concrete Factory Floors

One of the principal objections often raised against the use of concrete finished floors is the difficulty and cost of successfully repairing places that become worn or damaged. For best results it is usually considered necessary to cut down the worn place at least 1½ in. into the unbroken concrete, under-cut the edges, clean out the dust and loose particles thoroughly, wash with a thin cement grout, fill in with a paste grout and finally float to a level surface a mortar of cement and crushed stone or gravel. The patch must then be kept moist for at least a week or ten days, keeping all traffic off in the meantime.

W. P. Anderson, president Ferro Concrete Construction Company, Cincinnati, Ohio, states that his company often uses a method of patching concrete floors which is cheaper and requires far less time than the method commonly used. Mr. Anderson's method requires the use of mastic material made from a mixture of asbestos fiber and rubber gum. This mixture is applied with a trowel after thoroughly cleaning the damaged surface. Very little cutting of the old concrete is necessary, other than to break off loose particles. The gum can be worked to a feather edge, it is stated, so that it will readily join with the undamaged concrete surface and eliminate the under-cutting required with the old style of patch.

A patch of this sort can be opened to foot traffic within a few hours and to heavy traffic within a day or so. It is thus possible to repair a much-used portion of a mill or factory floor almost over night. The cost varies with the size of the patch, but is given as 16 to 18 cents per square foot.

Automobile Exports in Fiscal Year 1916

The exports of automobiles in the fiscal year ended June 30, 1916, reached a total of 77,496 machines, valued at \$97,464,381, compared with \$60,254,635 for the preceding year. June of this year, however, was over \$5,000,000 less than June, 1915. During the past fiscal year the exports were classified as follows: Commercial cars, 21,265, valued at \$56,805,548; passenger cars, 56,231, valued at \$40,658,833. During the fiscal year 1915 there were 37,876 machines exported, the value being \$60,254,635, consisting of 13,996 commercial cars, valued at \$39,140,682, and 23,880 passenger cars, valued at \$21,113,953.

Russian Steel Imports in 1915

Russian imports of certain steel products over the European, Russo-Finnish and Black Sea frontiers are given as follows in metric tons:

	1913	1914	1915
Wrought iron and steel.....	38,690	28,830	27,080
Tin plates and sheets.....	7,370	4,910	920
Wire and manufactures.....	8,710	7,490	48,660
Total	54,770	41,230	76,660

The large increase for 1915 over 1914 is due mostly to imports of barb wire.

Prizes awarded in May to employees of the Youngstown Sheet & Tube Company were for the following suggestions: Shoe for tap; bath for conveyor chain; slotting open-hearth skewback channels, and improvement on feed tables in the nail mill. The caliber of the suggestions may be gaged by the foregoing, and, as has been the practice of the management, the list of awards is made one of the regular bulletin-board announcements.

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Iron and Steel Markets

PRICES UP, LITTLE BUYING

Non-Cancellation Contract Provisions

Continued Weakness in Pig Iron—Strength in Semi-Finished Steel

Following the statement by the leading producer one week ago that it had raised the price of steel bars \$2 a ton, or to 2.60c., Pittsburgh, the same interest has announced similar advances in wire products and in contract plates and structural shapes. These put wire nails at \$2.60, fence wire at \$2.55, contract plates at 3c. and shapes at 2.60c.

In a slow market—from the domestic standpoint—these advances have given little stimulus to buying. Sales of bars have been made at 2.50c. in the week, pending business at that figure being more readily closed. While independent producers in some cases are quoting the higher prices, they have not been generally established.

The tactical significance of the bar advance, in view of the recent upheaval over the reported and denied sales of agricultural bars at 2.35c., has caused wide comment. Producers aver that the advance was made less to establish existing contracts at 2.50c. than to notify home consumers that foreign buying may leave less steel for home use in the first half of 1917 than has been reckoned.

Manufacturing consumers of steel are facing smaller demand for their products, in view of high prices. Implement makers count on a 25 per cent falling off in their sales and possibly more. They contend that bars should be reduced rather than advanced.

It is understood that recent contracts for bars for Europe provide that the full tonnage must be taken out, if not in bars, then in plates, shapes or other products. A non-cancellation proviso has also been inserted in certain contracts with buyers at home.

The greater part of the forgings and bars required for the large shell contracts recently placed with five important companies—amounting to nearly \$100,000,000—has been bought, but Europe is still asking for steel for this year's delivery, which few mills are able to take on. Two large Eastern interests are in the position of having to reserve capacity for Government orders, of which there is no definite assurance as yet.

Mills in Pittsburgh, Chicago and intervening districts report maximum losses in output from the excessive heat of the past week. The falling off in production of one Chicago interest has been as high as 1000 tons a day. In spite of the curtailment of shipments on this account in July, a reduction in Steel Corporation orders in the month has been indicated.

Railroad buying has been in a rut for weeks and

promised car inquiries are withheld. For the Havana Railway a 5000-ton rail order has been taken at Chicago and 10,000 tons more for Cuba is wanted. A considerable British rail inquiry is also reported.

The structural outlook is not promising, and after six weeks of light business fabricating companies are reselling some of their steel. There are reports, both of work going ahead because the realization of lower steel prices may be a good while delayed and of projects laid aside because the expected reductions have not come.

A sale of 9000 tons of plates at Chicago has resulted from a recent vessel order to a Pacific coast yard. At Pittsburgh ship plate capacity has been sold into the third quarter of next year.

In the Central West the market for semi-finished steel has stiffened, but Bessemer steel is still to be had at \$2 to \$3 a ton less than open-hearth. An export sale of 3000 tons of Bessemer sheet bars has been made at \$43, Pittsburgh.

The weakness in the pig-iron market is unrelieved, though more inquiry has appeared in the Central West. At Chicago Northern pig-iron producers are undercut by Southern iron, which has sold as low as \$13.50 at furnace for a 2.25 silicon grade. The Milwaukee machinists' strike has cut down foundry operations and with the slow improvement in labor conditions at Chicago foundry pig-iron production is for the time in excess of consumption.

At Pittsburgh sales of 20,000 tons of basic iron have been made at the uniform price of \$18 at Valley furnace. Some quiet buying by steel companies is rumored—all accomplished without lifting the market price.

Pittsburgh

PITTSBURGH, PA., Aug. 8, 1916.

The situation in this market during the past few days has been stronger, and the feeling of expectancy or uncertainty is more pronounced than it has been for at least two months. This followed a stiffening in semi-finished steel, including practically the whole range of hot rolled products. The continued demand and the inability to satisfy it have made the market for this class of material nominal, and makers announce that the prospects for the future made the advance in prices of wire, shapes, plates and bars advisable. The situation has been further marked by a labor shortage and consequent drop in production of about 10 per cent, due to the very hot weather. In the bar market mills have shown a disinclination to sell more than is necessary, and inquiries are not being closely followed up. With the advance in bars comes the announcement that mills will hereafter insist upon a non-cancellation policy on contracts, whether it is specifically mentioned or not, and customers will no longer arbitrarily get the benefit of a declining market. The general opinion of producers is that the market is headed into another buying movement. Present bar prices are for delivery up

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

	Aug. 9, 1916.	Aug. 2, 1916.	July 12, 1916.	Aug. 11, 1915.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia...	\$19.50	\$19.75	\$19.75	\$14.75
No. 2 Valley furnace...	18.25	18.25	18.25	13.25
No. 2 Southern, Cin'ti...	16.90	16.90	16.90	13.90
No. 2 Birmingham, Ala.	14.00	14.00	14.00	11.00
No. 2 furnace, Chicago*	18.50	19.00	19.00	13.25
Basic, del'd, eastern Pa.	19.00	19.00	19.00	15.25
Basic, Valley furnace...	18.00	18.00	18.00	14.00
Bessemer, Pittsburgh...	21.95	21.95	21.95	15.95
Malleable Bess., Ch'go*	19.00	19.00	19.50	13.25
Gray forge, Pittsburgh...	18.70	18.70	18.70	13.95
L. S. charcoal, Chicago...	19.75	19.75	19.75	15.75

Billets, etc., Per Gross Ton:	Aug. 9, 1916.	Aug. 2, 1916.	July 12, 1916.	Aug. 11, 1915.
Bess. billets, Pittsburgh...	43.00	43.00	40.00	23.00
O.-h. billets, Pittsburgh...	45.00	45.00	42.00	23.50
O.-h. sheet bars, P'gh...	45.00	45.00	42.00	24.00
Forging billets, base, P'gh	69.00	69.00	69.00	28.00
O.-h. billets, Phila.	45.00	45.00	45.00	30.00
Wire rods, Pittsburgh...	55.00	55.00	55.00	27.00

Finished Iron and Steel,	Aug. 9, 1916.	Aug. 2, 1916.	July 12, 1916.	Aug. 11, 1915.
Per Lb. to Large Buyers:				
Bess. rails, heavy, at mill	1.47 1/2	1.47 1/2	1.47 1/2	1.25
O.-h. rails, heavy, at mill	1.56 1/2	1.56 1/2	1.56 1/2	1.34
Iron bars, Philadelphia...	2.659	2.659	2.659	1.40
Iron bars, Pittsburgh...	2.60	2.50	2.50	1.30
Iron bars, Chicago...	2.35	2.35	2.35	1.20
Steel bars, Pittsburgh...	2.50	2.50	2.75	1.30
Steel bars, New York...	2.669	2.669	2.669	1.469
Tank plates, Pittsburgh...	3.50	3.50	3.50	1.25
Tank plates, New York...	3.669	3.669	3.669	1.419
Beams, etc., Pittsburgh...	2.50	2.50	2.50	1.30
Beams, etc., New York...	2.669	2.669	2.669	1.469
Skelp, grooved steel, P'gh	2.35	2.35	2.35	1.25
Skelp, sheared steel, P'gh	2.45	2.45	2.45	1.30
Steel hoops, Pittsburgh...	2.75	2.75	2.75	1.30

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Aug. 9, 1916.	Aug. 2, 1916.	July 12, 1916.	Aug. 11, 1915.
Per Lb. to Large Buyers:				
Sheets, black, No. 28, P'gh	2.90	2.90	2.90	1.85
Galv. sheets, No. 28, P'gh	4.25	4.25	4.25	3.85
Wire nails, Pittsburgh...	2.60	2.50	2.50	1.60
Cut nails, Pittsburgh...	2.60	2.60	2.60	1.60
Fence wire, base, P'gh...	2.55	2.45	2.45	1.40
Barb wire, galv., P'gh...	3.45	3.35	3.35	2.50

Old Material, Per Gross Ton:	Aug. 9, 1916.	Aug. 2, 1916.	July 12, 1916.	Aug. 11, 1915.
Iron rails, Chicago...	18.50	18.50	18.50	12.25
Iron rails, Philadelphia...	20.00	20.00	20.00	15.50
Carwheels, Chicago...	11.50	12.00	12.00	11.50
Carwheels, Philadelphia...	15.50	15.50	16.00	13.00
Heavy steel scrap, P'gh...	16.00	16.25	16.50	14.00
Heavy steel scrap, Phila.	14.75	14.75	15.00	13.50
Heavy steel scrap, Ch'go.	15.25	15.25	14.00	11.50
No. 1 cast, Pittsburgh...	15.00	15.00	15.75	12.50
No. 1 cast, Philadelphia...	16.00	16.00	16.00	13.00
No. 1 cast, Ch'go (net ton)	11.50	11.50	11.50	9.50
No. 1 RR. wrot, Phila...	19.50	19.50	19.50	14.25
No. 1 RR. wrot, Ch'go (net ton)	15.25	15.25	14.25	10.50

Coke, Connellsville, Per Net Ton at Oven:	Aug. 9, 1916.	Aug. 2, 1916.	July 12, 1916.	Aug. 11, 1915.
Furnace coke, prompt...	\$2.75	\$2.75	\$2.75	\$1.50
Furnace coke, future...	2.50	2.50	2.50	1.75
Foundry coke, prompt...	3.25	3.25	3.25	2.00
Foundry coke, future...	3.50	3.50	3.50	2.25

Metals,	Aug. 9, 1916.	Aug. 2, 1916.	July 12, 1916.	Aug. 11, 1915.
Per Lb. to Large Buyers:				
Lake copper, New York...	26.75	26.25	26.00	20.00
Electrolytic copper, N. Y.	26.50	26.00	25.75	17.75
Spelter, St. Louis...	8.12 1/2	9.25	8.75	14.00
Spelter, New York...	8.37 1/2	9.50	9.00	14.25
Lead, St. Louis...	5.75	6.00	6.25	4.40
Lead, New York...	5.95	6.10	6.45	4.50
Tin, New York...	37.67 1/2	38.00	38.50	34.62 1/2
Antimony, Asiatic, N. Y.	11.00	12.50	15.50	33.50
Tin plate, 100-lb. box, P'gh	\$6.00	\$6.00	\$6.00	\$3.10

to June 30 of next year. The foreign inquiry is the biggest immediate factor, and these buyers are looking forward to their requirements through the first half of 1917. Despite the shipping records being made in Lake iron ore, some manufacturers are looking ahead with reference to ore for use before the opening of navigation next spring.

Pig Iron.—Reported sales the past week include 10,000 tons of basic to the American Steel Foundries, for delivery over the remainder of the year, 5000 tons of basic for the same delivery and 5000 tons of basic for delivery in the first quarter of next year, all at \$18, Valley furnace. While this summarizes the principal sales, these seems to be a decided undercurrent of secret buying and selling, transactions evidently being made quietly to avoid a rise in the market, and indications point to a total of this class of business larger than those of the announced sales. There is considerable Bessemer inquiry for foreign shipment, but Eastern furnaces have preference in this class of business, because of freight differences, only one such sale being reported from the Pittsburgh district, this being 2000 tons at \$21, Valley furnace. We quote Bessemer iron at \$21, basic, \$18; gray forge, \$17.75 to \$18; malleable Bessemer, \$18.50 to \$19, and No. 2 foundry, \$18.25 to \$18.50, all at Valley furnace, the freight rate to the Pittsburgh and Cleveland districts being 95c. per gross ton.

Ferroalloys.—This market is inactive, as purchasers are apparently pretty well covered for a considerable time ahead. On ferrosilicon, one furnace is quoting lower than its competitors because of a better supply for prompt delivery. A peculiar feature of this market is that there is a heavy export inquiry for the higher percentages of ferrosilicon, but no concern is in position to furnish the material in large quantities. Domestic 80 per cent ferromanganese is quoted at \$165 to \$175 at furnace. We quote 18 to 22 per cent spiegeleisen at \$40 to \$45, and 25 to 30 per cent, \$55 to \$65, at furnace. On 50 per cent ferrosilicon, we quote \$88 to \$89 in lots up to 100 tons; over 100 tons, \$87 to \$88, and over 600 tons, \$86 to \$87, all per gross ton, f.o.b. Pittsburgh. We quote Bessemer ferrosilicon as follows: 9 per cent, \$30;

10 per cent, \$31; 11 per cent, \$32; 12 per cent, \$33; 13 per cent, \$34.50; 14 per cent, \$36.50; 15 per cent, \$38.50, and 16 per cent, \$41. Seven per cent silvery is \$28.50; 8 per cent, \$29; 9 per cent, \$29.50; 10 per cent, \$30; 11 per cent, \$31, and 12 per cent, \$32. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., all having a freight rate of \$2 per gross ton to Pittsburgh.

Billets and Sheet Bars.—A shortage of semi-finished material for prompt delivery has developed. An effort to buy a considerable quantity at \$1 per ton over recently quoted prices failed to get a supply. The scarcity is not confined to any one line, but is more decidedly noted on rods, billets and slabs. Foreign buyers are trying to cover through the first half of next year, and most of the recent important sales have been made for delivery abroad. The Pittsburgh Steel Company is expected to enter the market as a seller next month, having considerable tonnage in excess of its own requirements, but it is understood a good part of this has been disposed of at current prices. Some consumers are tiding themselves over the present scarcity in supply by using the munition class A discards. Prices are only nominal. We quote soft open-hearth billets and sheet bars at \$45; Bessemer billets, \$43 to \$45, and Bessemer sheet bars, \$43 to \$45, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at \$69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets, running above 0.25 and up to 0.60 carbon take \$1 extra.

Structural Material.—Effective Friday, Aug. 4, some mills advanced structural shapes from 2.50c. to 2.60c., or an advance of \$2 per ton. New projects in the building trade are few, largely because of the inability of mills to supply material within a reasonable length of time. A good many jobs are about ready, but when projectors learn the best deliveries that can be made they hold plans in abeyance. One large mill, in advising a customer, figured out that in holding the cost of carrying vacant property as against the probable increased cost of material in the next year or 18 months it would be better to go ahead now, but investors as a rule have been

unable to see this viewpoint. The railroads are placing practically nothing in the way of bridges and other material. New inquiry is light, and mills are devoting their attention to getting out production on present contracts rather than sales. We quote beams and channels up to 15 in. at 2.60c. to 2.75c. at mill, for delivery in third and fourth quarter, and from stock 3.10c. for all shapes and 3.50c. for structural plates.

Steel Rails.—No sales of any considerable tonnage are reported, the leading interest in this district having nothing to offer on standard sections before the second half of next year. A better inquiry and sales are reported on light rails. We quote 25 to 45 lb. sections at \$47; 16 and 20 lb., \$48; 12 and 14 lb., \$49, and 8 and 10 lb., \$50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at 1.47½c., and of open-hearth, 1.56½c., Pittsburgh.

Plates.—An advance of \$2 per ton was announced by the leading interest on Friday, Aug. 4, the base price now being 3c. The situation in this line is tighter than it was a month or six weeks ago, although there is no great activity in fabricated steel, and railroads have assumed a waiting attitude. Mills are unable to take on any class of ship material for delivery before the third quarter of 1917. The general inquiry for cars is light, coming almost entirely from Western roads, and includes 1000 cars for the Nickel Plate, 300 automobile cars for the Northern Pacific, 500 hopper cars for the Delaware & Hudson and 500 box cars for the Minneapolis & St. Louis. We quote ¼-in. and heavier plates for delivery at convenience of the mill at 3c., and for shipment from stock, or during the next two months, at 3.50c. to 4c., f.o.b. Pittsburgh.

Sheets.—The inquiry for 10,000 tons of blue annealed sheets, mentioned in this report last week, has not materialized into a contract. Other new inquiry is still heavy. Prices are firm. We quote blue annealed sheets, Nos. 9 and 10, at 3c. to 3.25c., for delivery at convenience of the mill. We quote No. 28 Bessemer and open-hearth black sheets at 2.90c. to 3c.; No. 28 galvanized, Bessemer, and open-hearth, 4.25c. to 4.35c.; Nos. 22 and 24 black plate, tin-mill sizes, H. R. & A., 2.90c.; Nos. 25, 26 and 27, 3c. to 3.10c.; No. 28, 3.10c. to 3.15c., and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—Mills profess to see evidence of a new buying movement and will not open their books for next year's business until October. The labor situation presents the greatest difficulty in this trade, it being estimated that production has dropped off about 12 per cent, the men being unable to work on account of the excessively hot weather. The serious feature of this is that the hot weather has matured the corn crop earlier than usual, and therefore canners are importuning the mills to anticipate specifications on their contracts. The labor situation is illustrated by the fact that 49 new mills at five different plants, not including the 24 new mills at the new plant at Gary, Ind., are unable to operate more than half time because of the lack of skilled men. Nothing is expected of the Gary mill before Jan. 1. We quote primes at \$6 to the domestic trade, while for export, \$6.25 per base box, or higher, is quoted, wasters of suitable sizes often bringing full price. We quote 8-lb. coated ternes at \$8.80 for 200 lb. and \$9.10 for 214 lb., all f.o.b. Pittsburgh.

Skelp.—With the market very narrow, prices are nominal. We continue to quote grooved steel skelp at 2.35c. to 2.40c.; sheared steel skelp, 2.45c. to 2.50c.; grooved iron skelp, 2.70c. to 2.80c., and sheared iron skelp, 3c. to 3.10c., all delivered to consumers' mills in the Pittsburgh district.

Cold-Rolled Strip Steel.—The tonnage being placed is comparatively light. Prices range from \$6 to \$6.50 per 100 lb. for specifications placed against contracts for delivery prior to Dec. 31. The lack of big inquiry indicates that the heavy buyers are pretty well taken care of, and smaller buyers are paying from \$1 to \$3 per ton premium for prompt delivery. Shipment at mill convenience means about February of next year. Manufacturers will not open their books for 1917 de-

livery until the early part of October, or until after it becomes known what semi-finished steel prices will be for the first half of next year. The new contract provisions for cold-rolled strip steel manufacturers have brought forth considerable comment. These contracts are subject to no decline or cancellation, and discounts are computed from net amount of invoice after freight reductions, the practice heretofore having been to take the discount from gross delivered billing. Extras, standard with all the mills, were printed on page 810 of THE IRON AGE of March 30.

Wire Rods.—The unusually heavy demand for all kinds of semi-finished material applies particularly to rods, although prices have not changed. The minimum price on either Bessemer or open-hearth rods is \$55, and we quote soft Bessemer, open-hearth and chain rods at \$55 to \$60 per ton, f.o.b., Pittsburgh.

Wire Products.—A very much better demand for wire and wire nails is in evidence, indicating that jobbers have begun to stock up for fall trade. Heavy tonnages of barb wire for foreign shipment have been placed, and more inquiries are pending. Some difficulty has been encountered because of credits. An advance of \$2 per ton was made in wire products last week, and regular prices are now as given on another page.

Iron and Steel Bars.—With the advance of \$2 per ton, or 2.60c., base, announced on bars, effective Friday, Aug. 4., the leading interest put into effect a non-cancellation clause, providing that hereafter a sale would be considered a sale and the purchaser would no longer be given the benefit of a declining market. While in some quarters the stability of this price is doubted, mills announce that it holds good for specifications between now and June 30 of next year, opening up bookings for the first half of 1917. Current promises on small bars run into second quarter of next year. Several inquiries came out in the past week for munition bars, but nothing has been definitely placed. Several manufacturers who had not previously covered are reported in a bad way for bar stock. Nearly all large consumers are covered ahead. We quote steel bars at 2.60c. for delivery at convenience of the mill, and small rounds from stock at 3.10c., and for large rounds, 2-in. and over, from stock at 3.75c. We quote refined iron bars at 2.60c., and railroad test bars, 2.70c. to 2.80c. at mill.

Shafting.—There is comparatively little new demand, largely because of the filled up condition of the mills and the fact that large consumers are covered for several months ahead. The discounts quoted below can still be obtained, but the advance in semi-finished material will probably cause a reduction in discounts to the minimum figure. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b., Pittsburgh, freight added to point of delivery.

Boiler Tubes.—The demand for boiler tubes is unprecedented, and there appears to be no let-up on inquiry. Mills are filled with business and deliveries extend well over a year. Discounts on black and galvanized iron and steel boiler tubes are given on another page.

Wrought Pipe.—Reports are current of heavy sales of line pipe for delivery in California and of other sales to gas or oil companies in nearby territory, but details are not yet available. The National Tube Company and Spang, Chalfant & Co. divided 15 miles of 16-in. placed by the Philadelphia Company. There is a lively inquiry for oil country goods, but, owing to their filled-up condition, some mills are unable to take these contracts. Fairly prompt shipment can be made on butt weld sizes of pipe, but mills are sold up for six months or longer on lap weld sizes. Discounts on black and galvanized iron and steel pipe are given on another page.

Coke.—There is no new demand of note. The feature seems to be a considerable shortage of production in the Connellsville region, because of inability to get men during the excessively hot weather. This fact is responsible for a reduction of about 25 per cent in coke

production in the past three or four weeks. Furnaces have contracted for the remainder of the year on their supply of coke and prices remain about stationary. We quote furnace coke for prompt shipment at \$2.50 to \$2.75, and on contracts over the remainder of the year from \$2.35 to \$2.50, depending on the quality. We quote best grades of 72-hr. foundry coke for prompt shipment at \$3 to \$3.25, and on contracts \$3.25 to \$3.50 per net ton at oven.

Railroad Spikes.—It is understood that the United States Steel Corporation took the order for 50,000 kegs of dog-eared spikes from Russia and placed it with Dilworth, Porter & Co., Pittsburgh. Regular prices of spikes are as follows:

Standard railroad spikes, $4\frac{1}{2}$ x 9/16 in. and larger, \$2.65 to \$2.75; railroad spikes, $\frac{1}{2}$ and 7/16 in., \$2.75 base; railroad spikes, $\frac{3}{4}$ in. and 5/16 in., \$3.05 base; boat spikes, \$2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Merchant Steel.—Conditions are without change. Prices on small lots are about as follows: Iron-finished tire, $\frac{1}{2}$ x $1\frac{1}{2}$ in. and larger, 2.50c., base; under $\frac{1}{2}$ x $1\frac{1}{2}$ in., 2.60c.; planished tire, 2.70c.; channel tire, $\frac{3}{4}$ to $\frac{1}{2}$ and 1 in., 2.85c. to 2.95c.; $1\frac{1}{2}$ in. and larger, 3.25c.; toe calk, 2.95c. to 3.05c., base; flat sleigh shoe, 2.70c.; concave and convex, 2.75c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; spring steel, 2.95c. to 3.05c.; machinery steel, smooth finish, 2.75c.

Rivets.—New inquiry is reported heavy. The advance in steel bars has not yet affected makers' prices on rivets, which are unchanged as follows: Buttonhead structural rivets, $\frac{1}{2}$ in. in diameter and larger, \$4 per 100 lb., base, and conehead boiler rivets, same sizes, \$4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Old Material.—The local scrap market is inactive, with an inclination to lower prices on some lines. Consumers seem to be well covered and, on the other hand, only small lots are being offered for sale. Prices quoted by dealers for delivery in Pittsburgh and nearby districts that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	\$16.00 to \$16.50
No. 1 foundry cast	15.00 to 15.25
Re-rolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	16.25 to 16.50
Hydraulic compressed sheet scrap	13.50 to 13.75
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	11.25 to 11.50
Bundled sheet stamping scrap	10.75 to 11.00
No. 1 railroad malleable stock	13.50 to 14.00
Railroad grate bars	9.00 to 9.25
Low phosphorus melting stock	19.50 to 20.00
Iron car axles	27.00 to 27.50
Steel car axles	27.00 to 27.50
Locomotive axles, steel	28.00 to 28.50
No. 1 bushing scrap	13.00 to 13.25
Machine-shop turnings	8.00 to 8.25
Old carwheels	13.00 to 13.25
Cast-iron borings	8.00 to 8.25
*Sheet bar crop ends	16.50 to 17.00
No. 1 railroad wrought scrap	17.50 to 18.00
Heavy steel axle turnings	11.00 to 11.25
Heavy breakable cast scrap	12.50 to 12.75

*Shipping point.

Nuts and Bolts.—Consumers not covered by contracts are buying from hand to mouth. Manufacturers report mill conditions as to orders a little faster coming in than going out. The advance in bar prices has not affected the market on nuts and bolts. Discounts in effect from May 19 are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50; large, 40.

Machine bolts, h. p. nuts, small, rolled thread, 50, 10 and 5 per cent; small, cut thread, 50 and 5; large, 40 and 10.

Machine bolts, c. p. c. and t. nuts, small, 40, 10 and 5 per cent; large, 35 and 5. Blank bolts, 40 and 10 per cent; bolt ends with h. p. nuts, 40 and 10; with c. p. nuts, 35 and 5. Rough stud bolts, 15. Lag screws (cone or gimlet point), 50 and 10.

Forged set screws and tap bolts, 10 per cent. Cup and round point set screws, case hardened, 60. Square and hexagon head cap screws, 55. Flat, button, round or fillister head cap screws, 30.

Nuts, h. p. sq., tapped or blank, \$2.90 off list; hex., \$2.90 off; c. p. c. and t. sq. tapped or blank, \$2.60 off; hex., \$3 off; semi-finished hex., 60 and 10 per cent; finished and case hardened, 60 and 10.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 10 per cent.

Chicago

CHICAGO, ILL., Aug. 9, 1916.—(By Wire.)

In the face of production reduced from 15 to 25 per cent because of the excessive heat, specifications continue to run as much as 40 per cent in excess of shipments. The pressure on Western mills still seems to be considerably less than in the East, as illustrated last week by the purchase of 2100 kegs of track bolts at Chicago by the Boston & Maine Railroad against a freight rate of \$6 per ton, as well as the placing of an order for 5000 tons of rails for Cuba. The effect of the advance of \$2 per ton on bars, shapes and plates is not yet clearly manifested, though some small implement bar contracts were closed at 2.50c. On the eve of the advance an unusually large number of small contracts for structural steel were closed. An order for 9000 tons of plates for the Pacific coast has been taken, and for prompt shipment of wide plates 4c., Pittsburgh, can still be secured. New York Central Lines are in the market for 1000 cars. The Northern pig-iron market is being held on its present basis by a very slender thread. Inquiry now in the market is reported to have brought out lower quotations in keeping with Southern prices. Local merchant furnaces have booked a round tonnage of steel-making iron for export.

(By Mail)

Pig Iron.—Local sellers of pig iron are holding to their position with considerable difficulty. With malleable iron now down to \$19 and the competitive situation with respect to foundry iron calling for prices approximating \$18 if business is to be secured, the arbitrary maintenance of a price \$1 per ton higher is certain to be severely tested. There is in the market inquiry for various lots of iron ranging from 500 to 3000 tons, a considerable portion of which is regularly taken by Northern furnaces, but which in the present market would doubtless go to the South unless there is a reduction in local prices. Quotations made last week by Southern furnaces were as low as \$13.50 at furnace for iron with silicon 2.25 per cent and over. Northern makers still have on their books a large proportion of contracts taken at higher prices and it has been felt that a reduction in the face of this undelivered iron would be very unfortunate. With labor conditions at Chicago improving but slowly and in Milwaukee with the foundries increasingly affected by the shutting down of machine shops to which they furnish castings, the situation is rendered even more unsatisfactory. While there is more inquiry in the market, including some for the first half of next year, negotiations move very slowly and a small proportion of purchases ensues. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of \$1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	\$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	\$19.00 to 19.50
Northern coke foundry, No. 2	18.50 to 19.00
Northern coke foundry, No. 3	18.00 to 18.50
Southern coke, No. 1 f'dry and 1 soft	18.00 to 18.50
Southern coke, No. 2 f'dry and 2 soft	17.50 to 18.00
Malleable Bessemer	19.00
Basic	19.00 to 19.50
Low phosphorus	34.00
Silvery, 8 per cent	22.50
Bessemer ferrosilicon, 10 per cent	32.50

Rails and Track Supplies.—The placing in this market of an order for 2100 kegs of heat-treated track bolts for the Boston & Maine Railroad and the purchase here of 5000 tons of rails by the Havana Railway for forward delivery are indicative of the exceptional conditions prevailing. Clearly Eastern mills have no desire for additional business in some lines at least. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to

3.50c., base, all in carload lots, Chicago; tie-plates, \$50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, \$33, base; open-hearth, \$35; light rails, 25 to 45 lb., \$40; 16 to 20 lb., \$41; 12 lb., \$42; 8 lb., \$43; angle bars, 2c., Chicago.

Structural Material.—The number of small contracts placed last week plainly indicates that many projects involving no great quantity of steel, which have perhaps been held up by high prices, are now to be put through on the strength of the belief that further delay will avail nothing. The American Bridge Company will furnish 650 tons for the Montana Power Company, 270 tons of bridge steel for the St. Louis Southwestern Railway, 330 tons for the capitol building at Jackson, Miss., 660 tons for an Illinois Steel Company shop extension at Gary, 300 tons of bridges for the Denver & Rio Grande Railroad and an additional 400 tons in three other contracts. The building for the Western Crucible Steel Castings Company at Minneapolis will be fabricated by the Minneapolis Steel & Machinery Company and the Decatur Bridge Company will furnish 500 tons for the State Hospital at Alton, Ill. On Aug. 4 the price of structural material from mill was advanced \$2 per ton, and we quote for Chicago delivery 2.789c.

We quote for Chicago delivery of structural steel from jobbers' stock 3.10c.

Plates.—The inquiry in this market for plates is unimportant except that which comes from the Pacific coast for shipbuilding purposes. A sale of this latter character involving 9000 tons was made last week on the basis of 3c., Pittsburgh. For the local scattering business, the status of the market is illustrated by one sale of tank plates of ordinary width at 3.25c. for delivery in three to four weeks, while another sale of plates, 92 in. wide, was made on the basis of 4c., Pittsburgh, delivery to be made in one month. Prices were advanced Aug. 4 from 2.90c. to 3c., Pittsburgh, and we quote for Chicago delivery from mills at their convenience 3.189c. For prompt shipment we quote 3.439c. to 3.689c.

We quote for Chicago delivery of plates out of jobbers' stock 3.50c.

Sheets.—Prices for galvanized sheets are again lower, and while the major portion of business booked last week was on the basis of 4.20c., Pittsburgh, for No. 28, one sale of No. 20 sheets is reported at the equivalent of 4.10c. Except for the little improvement in the interest attaching to galvanized sheets, little has been added to the activity in other grades. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.339c.; box annealed, No. 17 and lighter, 2.939c. to 3.039c.; No. 28 galvanized, 4.289c. to 4.389c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.10c. to 3.20c.; No. 28 galvanized, 5c. to 5.10c.

Rivets and Bolts.—The Wabash Railroad, whose inquiry for nuts and bolts was in the market last week, will not contract, it is understood, but will depend upon jobbers at St. Louis for its needs. Inquiry for both rivets and bolts is less than fair, but specifications are holding up well. We quote carriage bolts up to $\frac{3}{4}$ x 6 in., rolled thread, 50-10-5; cut thread, 50-5; larger sizes, 40-5; machine bolts up to $\frac{3}{4}$ x 4 in., rolled thread, with hot pressed square nuts, 50-10-10; cut thread, 50-10; larger sizes, 40-10-5; gimlet-point coach screws, 60; hot pressed nuts, square, \$2.90 off per 100 lb.; hexagon, \$2.90 off. Structural rivets, $\frac{3}{4}$ to $1\frac{1}{4}$ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 3.75c.; boiler rivets, 3.85c.; machine bolts up to $\frac{3}{4}$ x 4 in., 60-10; larger sizes, 50-10; carriage bolts up to $\frac{3}{4}$ x 6 in., 60-5; larger sizes, 50 off; hot pressed nuts, square, \$3.25, and hexagon, \$3.25 off per 100 lb.; lag screws, 65.

Bars.—The announcement of the advance of \$2 per ton in the price of bars came in the nature of a surprise to many users. The opportunity presented by some of the Western mills to their trade to contract for first half bars on the basis of 2.50c. was generally

neglected, but several negotiations which were under way on the eve of the advance were closed, although the entire quantity of material bought was not large. Additional foreign buying is materializing in an amount tending to support mill statements as to the steel supply available in the first half to a greater extent than was anticipated. There is some improvement in the demand for iron bars, but the interest in rail-carbon steel mentioned last week, and which was followed by a number of sales in small quantities, has not assumed any larger proportions. The excessive heat continues to curtail mill production. A large steel mill reports losing 1000 tons a day, while some of the bar mills are off 25 per cent in their production. We quote mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.789c.; hard steel bars, 2.50c.; shafting, in carloads, 25 per cent off; less than carloads, 20 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c. base with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting 10 per cent off.

Wire Products.—The expected advance in the price of wire has been announced and quotations are up \$2 per ton on nails, barb wire and similar products. No advance is announced on fencing or cement-coated nails. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, \$2.939; wire nails, \$2.789; painted barb wire, \$2.939; galvanized barb wire, \$3.639; polished staples, \$2.939; galvanized staples, \$3.639; all Chicago.

Cast-Iron Pipe.—The pipe business of the week was of little consequence. Additional inquiry includes 200 tons for Sheridan, Mont., and 125 tons for Arnold, Neb. Several lettings scheduled for last week have carried over into the current week. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$33.50 to \$34; 6 in. and larger, \$30.50 to \$31, with \$1 extra for class A water pipe and gas pipe.

Old Material.—The scrap market is exceedingly dull. On the one hand the merchandisers of scrap seem not to be especially desirous to sell, while the former apathy of consumers is accentuated by the fact that their operations have been curtailed by the hot weather and their consumption of scrap correspondingly reduced. Shipments of steel scrap to Gary on the recent order for that delivery have been temporarily stopped. Prices, however, reflect the reduced quantity of scrap offered for sale and are higher for a number of grades, particularly those having a sympathy with steel scrap. Railroad offerings include 2000 tons from the Big Four, 3500 tons from the Wabash, of which 2100 tons consists of carwheels, 800 tons from the Milwaukee and 500 tons each from the Soo Line and Pere Marquette. A sale of carwheels was made last week on the basis of \$11.50, delivered, Chicago. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	.....	\$18.50 to \$19.00
Relaying rails	.....	19.50 to 20.50
Old carwheels	.....	11.50 to 12.00
Old steel rails, rerolling	.....	15.50 to 15.75
Old steel rails, less than 3 ft.	.....	15.75 to 16.00
Heavy melting steel scrap	.....	15.25 to 15.50
Frogs, switching and guards, cut apart	.....	15.25 to 15.50
Shoveling steel	.....	14.75 to 15.00
Steel axle turnings	.....	9.25 to 9.75

Per Net Ton

Iron angles and splice bars	.....	\$18.75 to \$19.00
Iron arch bars and transoms	.....	19.50 to 20.00
Steel angle bars	.....	13.75 to 14.25
Iron car axles	.....	25.50 to 26.00
Steel car axles	.....	28.00 to 28.50
No. 1 railroad wrought	.....	15.25 to 15.75
No. 2 railroad wrought	.....	14.50 to 14.75
Cut forge	.....	14.50 to 14.75
Pipes and flues	.....	10.75 to 11.00
No. 1 busheling	.....	12.25 to 12.75
No. 2 busheling	.....	8.50 to 9.00
Steel knuckles and couplers	.....	14.00 to 14.50
Steel springs	.....	14.50 to 15.00
No. 1 boilers, cut to sheets and rings	.....	10.25 to 10.75
Boiler punchings	.....	13.75 to 14.25
Locomotive tires, smooth	.....	20.00 to 20.50
Machine-shop turnings	.....	5.50 to 6.00
Cast borings	.....	6.00 to 6.50
No. 1 cast scrap	.....	11.50 to 12.00
Stove plate and light cast scrap	.....	9.25 to 9.75
Grate bars	.....	10.00 to 10.25
Brake shoes	.....	9.75 to 10.25
Railroad malleable	.....	11.25 to 11.75
Agricultural malleable	.....	10.75 to 11.25

Philadelphia

PHILADELPHIA, Pa., Aug. 8, 1916.

The market is strong except in pig iron and old material. In view of the heavy production of finished products, the manner in which these raw materials lag behind, both as to activity and prices, causes much discussion. Pig iron is quiet, and lower prices are heard of in connection with the few transactions consummated. Old material is stagnant, except so far as steel axles for export are concerned. Plates continue to lead in demand. Bars are stronger; likewise billets. Deliveries of structural shapes are some months off, and they maintain their strength despite the lack of new projects involving their use. Some makers have not been able to consider the requirements of the Baldwin Locomotive Works for 26,000 tons of shell steel. Several hundred tons of sheet piling are under inquiry for prompt delivery in this vicinity. Reasonably prompt deliveries can be made of this product.

Pig Iron.—The monotonous quiet of the past few weeks was relieved to a slight extent last week by the purchase of two lots of around 1000 tons each, one consisting of gray forge for prompt delivery, taken at the minimum price, and the other divided among various grades, including some Virginia resale iron. The latter was taken by a Camden consumer, well known as a close buyer. Aside from these transactions, activity was confined to a few small scattering lots of small size. As might be expected, the present dullness has developed some soft spots and the range of quotations is wider than usually prevails. Eastern Pennsylvania No. 2 X is quoted from \$19.50 to \$20.25, delivered. Producers who are well sold up are inclined to hold their prices steady, but others will make concessions. Producers of Virginia iron, being sold ahead, assert that there has been no reduction in their quotations, but resale iron of their make which has been in speculative hands has been offered at substantial concessions, one sale having been made at \$16.75, furnace, equal to \$19.50, Philadelphia. Another Virginia brand has sold at \$17.50, furnace, or \$20.25, Philadelphia, prompt delivery. Basic, at \$19, delivered, the price involved in the last sale, is quiet, although rumors of impending buying of moderate proportions are heard. Standard low phosphorus continues firm at \$34 Philadelphia, and the supply is insufficient to meet the export demand. In one instance an export inquiry for 10,000 tons was turned down by a producer who did not wish to oversell. The high humidity of the past few days has lessened production. Burnham, Pa., and several points in New England are under embargo with respect to deliveries of iron. On the other hand, many foundries are suffering from a shortage in help which cuts down their melt, a phase of the situation which will enable some producers to give more attention to export requirements. Throughout the trade there is a strong feeling that the fall will bring heavy buying. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry.....	\$19.50 to \$20.25
Eastern Pa., No. 2 plain.....	19.25 to 20.00
Virginia No. 2 X foundry.....	20.25 to 21.25
Virginia, No. 2 plain.....	20.00 to 20.75
Gray forge	18.50 to 19.00
Basic	19.00
Standard low phosphorus.....	34.00

Iron Ore.—Arrivals of foreign ore at this port in the week ended Aug. 5 were confined to 6400 tons from Spain.

Billets.—The only quotation for open-hearth rerolling billets obtainable from an eastern Pennsylvania producer, others being out of the market, is \$45, mill. Bessemer billets can be had at the same figure, but at Pittsburgh base.

Ferroalloys.—The quotation for 80 per cent ferromanganese, domestic or foreign, and any delivery, is \$175, seaboard, but it is conceded that the price for domestic material might be shaded, probably \$5 per ton. The arrival is reported at this port last week of 300 tons of English ferromanganese. Spiegeleisen is quoted at \$50, furnace. Fifty per cent ferrosilicon is strong at \$86 to \$88, Pittsburgh, according to quantity;

its strength being due to the fact that, while consumption has greatly increased, production has remained about the same. For 11 per cent ferrosilicon the quotation is unchanged at \$34.44, delivered.

Plates.—Mills are getting further behind in deliveries, rather than catching up. One Eastern maker quotes 4.159c., Philadelphia, on sheared plates, delivery in ten months. On universal it can do better, making delivery in six to eight weeks. It can supply flanged and dished heads in eight to ten weeks. Another important maker also asks 4.159c., but one whose output is restricted as to sizes quotes 3.659c. Several large inquiries are in the market, coming from various directions. Norwegian shipbuilding interests having plants in this country want about 20,000 tons.

Bars.—Bessemer bars, which are becoming scarce, have been advanced to 2.759c., Philadelphia. While the nominal quotation for open-hearth bars is also 2.759c., Philadelphia, some makers ask 2.909c. Inquiry for shell steel is coming before this market, one such inquiry from the Baldwin Locomotive Works calling for 26,000 tons of 6½-in. bars. Iron bars are strong at 2.659c., Philadelphia. An advance is considered likely in view of the higher quotation for steel bars.

Structural Material.—Inquiry from small consumers is somewhat more active, but projectors of large propositions continue to keep out of the market. As far as can be learned, the Pennsylvania Railroad has not bought against its inquiry for 10,000 tons of plates, shapes and bars for 1917 delivery. The hot weather is interfering with production to a considerable degree. Quotations range from 2.909c. to 3.159c., Philadelphia, although one maker will sell only Bessemer shapes at the lower price. Another specifies December and January shipments only. The naval program of the United States is expected to develop a good bit of work, and the Government is understood to have already done some feeling round in regard to prices and deliveries.

Sheets.—Quotations range from 3.159c. to 3.659c., Philadelphia, for No. 10 blue annealed, according to delivery.

Coke.—Troubles incidental to hot weather continue to affect the trade adversely. There is considerable activity in foundry coke, but most of the buyers want deliveries in box cars, and the men rebel from the hot task of loading such cars. Low grade heating coke has sold at \$2.50 per net ton at oven. Spot foundry is quoted at \$3.15 to \$3.50 per net ton at oven, and contract at about the same figures. Furnace coke is quiet, with spot at \$2.75 and contract at \$2.50 per net ton at oven. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

Old Material.—For a few hours the railroad embargoes against Coatesville plants were raised. A few cars which had been delivered to main lines by branches were disposed of, but the raising of the restriction was of too short a duration to do much good. Cars which have been loaded for months are yet to be delivered. In one case a car loaded in February has just been taken out of the way. Meanwhile no small amount of dealers' money is tied up. Up to \$35 is said to have been offered in New York for steel axles wanted abroad. New domestic business continues stagnant. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel.....	\$14.75 to \$15.25
Old steel rails, rerolling.....	17.00 to 18.00
Low phos. heavy melting steel scrap..	20.50 to 21.50
Old steel axles (nominal).....	30.00 to 31.00
Old iron axles (nominal).....	28.00 to 29.00
Old iron rails	20.00 to 20.50
Old carwheels	15.50 to 16.00
No. 1 railroad wrought.....	19.50 to 20.00
Wrought-iron pipe	12.50 to 13.00
No. 1 forge fire	12.50 to 13.00
Bundled sheets	12.50 to 13.00
No. 2 busheling	10.50 to 11.00
Machine-shop turnings	8.50 to 9.00
Cast borings	10.00 to 10.50
No. 1 cast	16.00 to 16.50
Grate bars, railroad.....	11.75 to 12.25
Stove plate	11.75 to 12.25
Railroad malleable	13.50 to 14.00

Cincinnati

CINCINNATI, OHIO, Aug. 9, 1916.—(By Wire.)

Pig Iron.—Buyers are taking more interest, although no transactions of note have featured the past week. The leading steam pump interest is asking for approximately 15,000 tons for first half shipment to be apportioned among its different plants, of which 1700 tons is intended for its Cincinnati foundry. A consumer in southern Ohio wants 700 tons of No. 1 foundry for this year's shipment. A northern Ohio melter is asking for quotations on 3000 tons of malleable for the same delivery, but frankly states that it may not place the order promptly. Another inquiry for 2000 tons of malleable is reported from Chicago territory. A St. Louis firm bought 700 tons of Lake Superior charcoal for shipment in the remainder of the year, and 500 tons of Southern foundry was taken by an Indiana melter with shipments extending into the first quarter of next year. The Southern market is weaker. While prompt furnace prices range from \$14 to \$14.50, Birmingham basis, it is reported that the lower figure can be shaded on desirable business for nearby shipment. Southern Ohio furnaces are not fighting for foundry orders, and as a consequence have been able to maintain regular market quotations. No additional basic sales have been made in this territory, and users of basic deny that they are in the market for a future supply. The Ohio silvery irons are unchanged at \$27, furnace, for an 8 per cent analysis, but no orders have been reported lately. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	\$17.40 to \$18.40
Southern coke, No. 2 f'dry and 2 soft.	16.90 to 17.90
Southern coke, No. 3 foundry.	16.40 to 17.40
Southern coke, No. 4 foundry.	15.90 to 16.90
Southern gray forge.	15.40 to 16.40
Ohio silvery, 8 per cent silicon.	28.26 to 28.76
Southern Ohio coke, No. 1.	20.76 to 21.26
Southern Ohio coke, No. 2.	19.76 to 20.26
Southern Ohio coke, No. 3.	19.26 to 19.76
Southern Ohio malleable Bessemer.	19.76 to 20.26
Basic, Northern.	19.76 to 20.26
Lake Superior charcoal.	21.20 to 22.20
Standard Southern carwheel.	24.90 to 25.40

(By Mail)

Finished Material.—Galvanized sheets are a little weaker, No. 28 now ranging from 4.40c. to 4.50c., Cincinnati or Newport, Ky., but black sheets are unchanged around 3c. The mills report prompt shipment business as showing some improvement, but no efforts are being made to take long time contracts even at the present figures. The warehouse price on No. 28 galvanized sheets averages about 5.15c. Jobbers of finished material state that the slack is being taken up due to the inactivity in all lines of industry on account of the hot spell in July and that orders are now coming in at a much more satisfactory rate. As a rule, the local warehouses are able to make prompt shipments on twisted steel bars and other commodities, as they had contracted ahead, although there is some complaint as to mill shipments being slow. We quote from local stocks, steel bars and small structural shapes, 3.20c.; twisted steel bars, 3.35c.; plates, 3.50c.; wire nails, \$2.75 per keg, base; barb wire, \$3.60 per 100 lb., and No. 10 blue annealed sheets 3.50c.

Coke.—The foundries are consuming a slightly larger tonnage than last week's report indicated, but a number of shipments due are still being held up. No interest is taken in furnace coke as far as new contracting is concerned, but furnaces in southern Ohio are taking shipments as fast as they come forward. We quote contract Connellsville 48-hr. coke around \$2.50 to \$2.75 per net ton at oven and 72-hr. foundry coke around \$3.25 to \$3.50. Foundry coke in the Wise County and Pocahontas fields is quoted on a level with Connellsville prices with 25c. per ton added for special brands. New River foundry coke is stationary at \$4 at oven.

Old Material.—Prices on all kinds of scrap are soft and a few small reductions are quoted on different grades. Business is not satisfactory, more scrap being received than is being shipped out. Both cast borings and steel turnings are hard to get rid of, and as a con-

sequence quotations now are lower than probably in the history of the trade. Iron axles have taken an advance of \$1 per ton. The following are dealers' prices to consumers, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap.	\$10.75 to \$11.25
Old iron rails.	15.50 to 16.00
Relaying rails, 50 lb. and up.	21.00 to 21.50
Rerolling steel rails.	14.50 to 15.00
Heavy melting steel scrap.	14.00 to 14.50
Steel rails for melting.	13.00 to 13.50
Per Net Ton	
No. 1 railroad wrought.	\$13.25 to \$13.75
Cast borings.	4.50 to 5.00
Steel turnings.	5.00 to 5.50
Railroad cast scrap.	11.00 to 11.50
No. 1 machinery cast scrap.	12.75 to 13.25
Burnt scrap.	8.25 to 8.75
Iron axles.	22.00 to 23.00
Locomotive tires (smooth inside).	19.75 to 20.25
Pipes and flues.	9.25 to 9.75
Malleable and steel scrap.	10.75 to 11.25
Railroad tank and sheet scrap.	8.25 to 8.75

Cleveland

CLEVELAND, OHIO, Aug. 8, 1916.

Iron Ore.—Prospects continue to brighten for making an extraordinary record for Lake Superior ore movement this year, for several uncertainties appear to be disappearing after threatening to mar the present smoothness of operation. The advance of \$10 a month in wages of Lake seamen, announced in the past week, is the second such advance this year, the previous one having been made at the opening of navigation. The regular October advance is also likely to come along as usual, in compensation for the more arduous autumn work. The Mesaba mine strike situation, which has caused some thought among shippers in the past few weeks, is scarcely mentioned now. The receipts of ore at lower Lake ports in July were 7,681,084 tons, out of a total of 9,750,157 tons shipped from Lake Superior mines. While several ore-carrying records were made in July, due to favorable weather, water and loading conditions, it is believed unlikely that further records will be established this year, since the recommended loading depth has been raised by the Lake Carriers' Association. Because of some labor difficulties at Superior, Wis., coal docks, more vessels seem to be available for ore loading this week. We quote ore prices as follows, delivered lower Lake ports: Old range Bessemer, \$4.45; Mesaba Bessemer, \$4.20; old range non-Bessemer, \$3.70; Mesaba non-Bessemer, \$3.55.

Pig Iron.—Keener interest is being shown in the pig iron market by consumers in northern Ohio, and is being put into the form of inquiries—the first demonstration of this sort in several months. Some of the inquiries received are for delivery in the last quarter of this year, tending to show expectation of increased melt, since various local labor disputes are being adjusted and foundries are preparing to operate on more extensive scales. One Cleveland consumer has bought several thousand tons of foundry iron at the going market price, while a fair sized inquiry has been put out by a Toledo interest. Southern pig iron is not selling here and quotations are soft. We quote, delivered Cleveland, as follows:

Bessemer.	\$21.95
Basic.	18.95
Northern No. 2 foundry.	\$18.70 to 18.80
Southern No. 2 foundry.	18.00 to 18.50
Gray forge.	18.50
Jackson County silvery, 8 per cent silicon.	28.62 to 30.62
Standard low phos., Valley furnace.	32.00

Finished Iron and Steel.—The recently announced advances in steel bars, plates and shapes have had the effect of bringing upon mill representatives greater pressure for deliveries. Specifications are keeping up and as fast as any buyer lags, his tonnage is cut off the books. The structural steel advance, however, has had the effect of curtailing building somewhat. In the case of the Lasalle & Koch Building, planned for Toledo, and of which A. Bentley & Son are general contractors, it has been decided to turn from steel construction to concrete. In the original inquiry, 3500 tons of steel was asked. Keener competition is developing in blue annealed sheets, and it is understood 2.85c. has

been quoted on No. 10 to Cleveland consumers. Light plates are in good demand from local mills and prompt light plates are bringing 3.25c. to 3.50c.

Nuts, Bolts and Rivets.—Further improvement is noted in the volume of new inquiry for nuts and bolts, especially for prompt shipment. Generally quotations are being maintained on the new business appearing, particularly in the Cleveland district. An active demand for rivets is reported. We quote rivets at 4c., Pittsburgh, for structural and 4.10c., Pittsburgh, for boiler rivets for prompt and contract. Bolt and nut discounts are as follows:

Common carriage bolts, $\frac{1}{2}$ x 6 in., smaller or shorter, rolled thread, 50 and 10; cut thread, 50; larger or longer, 40; machine bolts with h. p. nuts, $\frac{1}{2}$ x 4 in., smaller and shorter, rolled thread, 50, 10 and 5; cut thread, 50 and 5; larger and longer, 40 and 10; lag bolts, gimlet or cone point, 50 and 10; square h. p. nuts, blank or tapped, \$2.90 off the list; hexagon, h. p. nuts, blank or tapped, \$2.90 off; c. p. c. and t. sq. nuts, blank or tapped, \$2.60; hexagon nuts, all sizes, \$3 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 10.

Old Material.—Extreme dullness still enshrouds the Cleveland market, with consumers of all grades apparently uninterested in what happens. Embargoes continue at various mills in which Cleveland dealers are interested and shipments are slow. Local mills seem well stocked with material and are not in the market. Machine shop turnings especially are weak, at \$5.75 per net ton, in some Cleveland dealers' hands, while \$5.50 in some cases is quoted. Heavy melting steel is unchanged. We quote f.o.b. Cleveland as follows:

Per Gross Ton	
Steel rails	\$14.75 to \$15.00
Iron rails	18.50 to 19.00
Steel car axles	30.00 to 32.00
Heavy melting steel	15.00 to 15.25
Carwheels	12.75 to 13.00
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	12.50 to 12.75
Railroad malleable	14.00 to 14.25
Steel axle turnings	12.00 to 12.50
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton	
Iron car axles	\$24.00 to \$25.00
Cast borings	6.00 to 6.25
Iron and steel turnings and drillings	5.75 to 6.00
No. 1 busheling	11.00 to 11.25
No. 1 railroad wrought (nominal)	15.00 to 15.50
No. 1 cast	13.00 to 13.50
Railroad grate bars	10.00 to 10.50
Stove plate	10.00 to 10.25

Buffalo

BUFFALO, N. Y., Aug. 8, 1916.

Pig Iron.—Although there is more or less inquiry for export, which, however, furnaces are too well sold up to consider, the domestic market is quiet. A good many melters have not yet bought to cover their full requirements for the last quarter, and when consumers get around to their needs for first half producers expect there will be a firming up. The price situation for the week is about the same as a week ago, with a range of \$18 to \$19 for foundry grades. We quote as follows, f.o.b. furnace, for last-half delivery, extending in some instances into first half of next year:

No. 1 foundry	\$19.00
No. 2 X foundry	\$18.50 to 19.00
No. 2 plain	18.50 to 18.75
No. 3 foundry	18.50 to 18.75
Gray forge	18.25 to 18.50
Malleable	18.50 to 19.00
Basic	19.00 to 20.00
Bessemer	21.00 to 22.00
Charcoal, regular brands and analysis	21.00 to 22.00

Finished Iron and Steel.—Some agencies report that the increase in price of steel bars, structural material and small shapes has stimulated interest in buying and considerable business is being offered outright for delivery at mills' convenience. In some lines deliveries are not obtainable under ten months. Inquiry for contract coverings into next year is reported. Quite a little buying of wire products is noted at the advance of \$2 per ton. The demand for blue annealed, black and galvanized sheets has increased noticeably in the past ten days. Buffalo will take bids soon for a 1000-ton bascule bridge over Buffalo River at Abbott Road. The Lackawanna Bridge Company has taken 2500 tons for the open-hearth plant of the Brier Hill Company, in addition to the open-hearth extension made last winter.

Old Material.—The market shows about the same degree of activity as reported last week, with good demand for heavy melting steel, largely from outside territory. In other lines most of the sales made were of small tonnages. Prices are practically unchanged from a week ago. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	\$15.50 to \$16.00
Low phosphorus steel	20.00 to 20.50
No. 1 railroad wrought scrap	17.25 to 17.75
No. 1 railroad and machinery cast scrap	15.50 to 16.00
Steel axles	30.00 to 31.00
Iron axles	26.00 to 27.00
Carwheels	13.00 to 13.50
Railroad malleable	15.00 to 15.50
Machine shop turnings	6.00 to 6.50
Heavy axle turnings	12.00
Clean cast borings	7.25 to 7.75
Iron rails	18.00 to 18.50
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	12.00 to 12.50
Bundled sheet scrap	11.50 to 12.00
No. 1 busheling	13.00 to 13.50
No. 2 busheling	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

St. Louis

ST. LOUIS, Mo., Aug. 7, 1916.

Pig Iron.—Buying has been at a standstill, melters continuing disposed to keep out of the market. Moreover, the intense heat which has prevailed in this territory has had the tendency to reduce melting, though there is good evidence that there is business ahead to be cared for later in the fall.

Coke.—No business has appeared involving any considerable tonnage. Melters are well supplied or at least well contracted ahead.

Old Material.—Scrap showed a distinctly better tone and the dealers began to buy during the week, though the steel plants and rolling mills, while nibbling at the market, placed no orders of consequence. It is, therefore, for the present a dealers' speculative market, with the belief strong that prices are going to be higher. For that reason prices are advanced quotably, though the transactions actually taking place do not altogether seem to warrant it as yet at least. Relaying rails are decidedly stiffer and hard to get at any price. Lists out during the week included 2000 tons from the Wabash, 425 tons from the Kansas City Southern, 500 tons from the Vandalia, 3000 tons from the Big Four and 1000 tons from the Union Pacific. We quote dealers' prices, f.o.b., customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails	\$16.25 to \$16.75
Old steel rails, rerolling	14.75 to 15.00
Old steel rails, less than 3 ft.	15.00 to 15.50
Relaying rails, standard section, subject to inspection	23.00 to 24.00
Old carwheels	11.50 to 12.00
No. 1 railroad heavy melting steel scrap	14.50 to 15.00
Heavy shoveling steel	13.50 to 14.00
Frogs, switches and guards cut apart	14.50 to 15.00
Bundled sheet scrap	8.00 to 8.50

Per Net Ton	
Iron angle bars	\$16.00 to \$16.50
Steel angle bars	13.50 to 14.00
Iron car axles	24.50 to 25.00
Steel car axles	27.00 to 27.50
Wrought arch bars and transoms	19.50 to 20.00
No. 1 railroad wrought	14.50 to 15.00
No. 2 railroad wrought	14.25 to 14.50
Railroad springs	14.00 to 14.50
Steel couplers and knuckles	14.00 to 14.50
Locomotive tires, 42 in. and over, smooth inside	19.50 to 20.00
No. 1 dealers' forge	10.25 to 10.75
Cast-iron borings	6.50 to 7.00
No. 1 busheling	12.50 to 13.00
No. 1 boilers, cut to sheets and rings	9.50 to 10.00
No. 1 railroad cast scrap	11.00 to 11.50
Stove plate and light cast scrap	8.75 to 9.25
Railroad malleable	11.00 to 11.50
Agricultural malleable	10.00 to 10.50
Pipes and flues	10.50 to 11.00
Railroad sheet and tank scrap	9.75 to 10.25
Railroad grate bars	9.50 to 10.00
Machine-shop turnings	7.00 to 7.50

Finished Iron and Steel.—A distinctly better tone is apparent and on structural material several good contracts were closed for future delivery, four in particular aggregating about 7500 tons. Specifications on existing contracts were also more active. At the same time there seemed no disposition to take protective

measures against the situation reported threatened by heavy transactions for export. While there were no inquiries for standard section steel rails, there were some attractive specifications reported on light rail contracts for coal mine use. No lumber road business appeared. Movement out of warehouse has continued good, with prices quoted as follows: Soft steel bars, 3.15c.; iron bars, 3.10c.; structural material, 3.15c.; tank plates, 3.55c.; No. 10 blue annealed sheets, 3.45c.; No. 28 black sheets, cold rolled, one pass, 3.30c.; No. 28 galvanized sheets, 5c.

Birmingham

BIRMINGHAM, ALA., Aug. 7, 1916.

Pig Iron.—The status of the local furnace-iron market is unchanged. Sales are of small lots and they bring around \$15. Some metal, stated to be high in sulphur, the result of poor furnace work in July, was disposed of by one interest on a \$14.50 basis. A lot of 500 tons for Sweden was booked and a small lot was sold for Norway. Some rush shipments to the Pacific coast have been made to anticipate advance in freight rates of \$2.24 per ton Sept. 1. The movement generally is close to production, although the latter was in July, as in the eight preceding months, far ahead of all former records. Accumulations are at the rate of 5000 to 6000 tons per month. The long idle furnace of the Woodstock Corporation at Anniston is about to resume, with orders covering operations for some time to come. Crocker Brothers, New York, are financing and caring for the output. The Alabama Company is about to resume at its Gadsden stack, which will more than make up for the loss in output occasioned by the blowing out of one of the stacks at Ironaton. These furnace changes will add about 300 tons to the daily iron output of Alabama. Nothing further has been heard from the inquirers for round lots, to whom \$15 was quoted for this year and \$15.50 for next. Warrant iron is still seeking customers under furnace-iron rates. Some furnace metal has gone under \$15, but not sufficient to establish a lower basis. Speaking of the future, an iron man in an especially advantageous position to observe and to speak disinterestedly, says: "My inclination to be rather pessimistic over the foundry-iron situation in the South has changed to one of something like optimism, and this change is occasioned by special effort to ascertain the situation. The steel trade is in the pink of condition, with order books well filled for months to come. The demand for basic will be immense. This will cause many furnaces to go on basic and restrict foundry production. I have heard of \$14 Birmingham furnace iron and I have sent out men to find if this is true. In each instance, I have discovered that the reports were false. Alabama furnaces have for nine months made outputs far in excess of previous records, and, in spite of this, accumulations on yards during the lull in the buying movement have been very gradual. In the light of these conditions I am inclined to look for a maintenance of the \$15 basis rather than a lower price. In fact, I would not be surprised to see higher prices for foundry iron prevail the last quarter of this year and the first quarter of 1917." We quote, per gross ton, f.o.b. Birmingham furnace, as follows:

No. 1 foundry and soft.....	\$15.00 to \$15.50
No. 2 foundry and soft.....	14.50 to 15.00
No. 3 foundry.....	14.00 to 14.50
No. 4 foundry.....	13.75 to 14.25
Gray forge.....	13.50 to 14.00
Basic.....	14.50 to 15.00
Charcoal.....	22.00 to 22.50

Cast-Iron Pipe.—Several satisfactory Western orders were secured the past week by pipe interests which had not been so active as others, while the more active plants continue to report a considerable volume of small orders. No big buying movement has set in, nor is one expected in the near future, but the water and gas pipe foundries are in good shape. The sanitary shops are on short time. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$28; 6-in. and upward, \$25, with \$1 added for gas pipe and 16-ft. lengths.

Coal and Coke.—Coal prices are better than at this time last year. The output of steam mines is around

75 per cent of full production, while domestic mines are scarcely going more than three days per week. Coke has eased off, owing to the accumulations of furnace stocks occasioned by banking of furnaces during floods. Shipments are being rushed to the Pacific coast on account of the advance of \$2 per ton in freight rates Sept. 1. Some beehive foundry coke can now be had for \$4 per net ton at oven and the prevailing price is \$4.25, with some at \$4.50. Furnace coke remains at \$3.25 to \$3.50.

Old Material.—The market is listless except for a demand for export, in which case higher prices are offered, but no available ship room has been secured and hence no shipments have been made. Birmingham prices do not tally with those in the North because the classification here is more elastic. Steel axles would bring much more—as high as \$30—were they available in quantities; but they are not. We quote, per gross ton, f.o.b. dealers' yards (prices to mill and foundry consumers), as follows:

Old steel axles.....	\$22.00 to \$30.00
Old steel rails.....	10.00 to 10.50
No. 1 steel scrap.....	9.25 to 9.75
No. 1 wrought scrap.....	12.50 to 13.00
No. 1 cast scrap.....	10.50 to 11.00
Extra heavy cast scrap.....	9.50 to 10.00
Stove plate and light.....	9.00 to 9.50
Old carwheels.....	9.50 to 10.00
Tram carwheels.....	9.50 to 10.00

New York

NEW YORK, Aug. 9, 1916.

Pig Iron.—An assorted inquiry from the International Steam Pump Company, taking in charcoal iron, Bessemer, low phosphorus, high phosphorus and foundry grades has just been put out for five plants. The total is about 16,000 tons. Deliveries are to be in the first half of 1917 and it is stipulated that the quotation shall remain good until the company is ready to buy. Apart from this there is practically no domestic inquiry, if exception be made of 1000 tons of malleable asked for by a Connecticut foundry for delivery in the next few months. The market for export iron is still interesting. One lot of 10,000 tons of Bessemer has just been asked for and a contracting firm inquiring for 3000 tons, of which 2000 tons is for Switzerland. The Swedish inquiry is for 4000 tons to replace Middlesbrough iron. The Dutch Government is in the market for 1000 tons. A sale of 2000 tons of Bessemer is reported through a New York office at \$21, Valley furnace. The difficulty with exports is still that of getting vessel room. Figures have been asked on quite a little Southern iron, to go abroad. The New Haven road put an embargo on all shipments of coke and pig iron last week and this is still in force. We quote at tidewater for early delivery: No. 1 foundry, \$20.50 to \$21; No. 2 X, \$19.75 to \$20.25; No. 2 plain, \$19.50 to \$20; Southern iron at tidewater, \$19.50 to \$20 for No. 1 and \$18.50 to \$19 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Some shipments from Great Britain which were made in July have arrived since Aug. 1, but British makers have cabled that thus far no licenses have been issued for August shipments. No urgency exists, however, and the domestic market continues to show a sagging tendency. It is evident that \$170 is not the lowest that can be done on contract 80 per cent ferromanganese, and domestic makers have found a slow market. Ferrosilicon is strong, though some variations appear from the recent advance made by one seller, which gave a range of \$86 to \$88, Pittsburgh, the higher price being on carload lots. Ferrotungsten is easier, and recent offerings are reported on the basis of \$4.50 per pound of contained tungsten.

Finished Iron and Steel.—Some of the largely nominal quotations have been advanced \$2 per ton, and this fact with a better movement of specifications against contracts since Aug. 1 has given a turn to the sentiment developing in some quarters to the effect that some lopping off of prices would occur. The structural steel demand has not increased, and the sheet market is not active, but the narrower plates are perhaps in better demand. Pressure is developing from three sides: the prodigious demand from the Allies;

definite business from non-belligerent nations, and an increasing interest by the domestic consumer. In the case of the last there is some indication that the present period represents practically the first substantial attempt in a year to contract for a long period. The buying in the interim has been for specific jobs which were made to pay the cost, while up to the present it has still been possible to put into finished products steel which has been delivered under the yearly contract. Steel shapes are obtainable at 2.50c., Pittsburgh, but one mill is getting 2.75c. and higher for Bessemer steel delivered in 60 days. Steel bars seem now to be a minimum at 2.60c., Pittsburgh, with the deliveries at the convenience of the mill, while the Bessemer product lately obtainable at 2.50c., is difficult to secure at less than 2.75c., in 60 days. The situation in bar iron and plates has not changed materially, except less evidence of a search for business by the makers of the narrower plates. Little new work of size in the structural field has developed, but the Pennsylvania is asking prices on 14 bridges involving 1000 tons and Eastern bidding has been asking on 1000 tons for the Federal Rubber Company, at Cudahy, Wis. Other new work includes 430 tons for a power house for the American Gas Company at Waterloo, Iowa; 215 tons for a power house at Paulsboro, N. J., for the Vacuum Oil Company; 200 tons for an addition to the South Ferry Building, New York, and 260 tons for the Baltimore & Ohio at Defiance, Ohio. Structural awards include 600 tons for the Hotel Harrington addition, Washington, to Barber & Ross; 115 tons for the Baltimore & Ohio to the American Bridge Company, and 210 tons for the Bridgeport Savings Bank has been closed. In railroad cars the New York Central is asking for 1000 40-ton box cars. It is reported that the Baltimore & Ohio has bought 1500 second-hand hopper cars, a commentary on the attitude toward high prices of new rolling stock. In respect to the stability of prices in general, mention may be made of the closing of 5000 tons of cold rolled steel at 20 per cent off the list, representing a price twice the sum the buyer paid about a year ago. A firm quotation of 2.50c., Pittsburgh, on 10,000 tons of bars is also noted. We quote mill shipments of plain structural material at 2.669c. to 2.919c., New York; steel plates at 3.069c. to 4.169c., depending on the width of the plate as much as on delivery, and with universal plates easier by \$5 to \$10 per ton than sheared plates; steel bars at 2.769c. to 2.919c., the lower price for open-hearth steel at the convenience of the mill and little if any this year, with Bessemer bars in 60 days around 2.919c.; bar iron at 2.669c., New York. Out of warehouse we quote iron and steel bars and shapes at 3.25c. to 3.30c., New York, and plates at 4c. to 4.25c.

Cast-Iron Pipe.—The most interesting piece of news this week is the placing of an order for several thousand tons of pipe by the Eastman Kodak Company, Rochester, N. Y., with the Warren Foundry & Machine Company. The volume of business with private buyers generally is very good. Not so much is being done, however, in public lettings. The Department of Water Supply, Gas and Electricity of the city of New York will open bids Aug. 17 for a contractor's job for the Borough of Richmond (Staten Island), requiring about 100 tons. The city of Bloomfield, N. J., opened bids on about 130 tons on Monday evening of this week on which R. D. Wood & Co. were low bidders. No award has yet been made on the pipe for Troy, N. Y. Export inquiries are becoming much more numerous. Prices are firm, with a tendency to ask an advance for quick delivery. Carload lots of 6-in., class B and heavier, are quoted at \$30.50 per net ton, tidewater, class A and gas pipe taking an extra of \$1 per ton.

Old Material.—Old steel axles have lately been about the only commodity in good demand, being still wanted for export, while the supply is becoming limited. Relaying rails are offered somewhat freely and are lower. Trade generally continues extremely quiet, with practically no demand from steel works and rolling mills. One steel company in eastern Pennsylvania which has been a moderately good buyer for some time announces that its wants are now covered up to the end of this year. Brokers who purchase for the Pittsburgh market quote \$13.25 to \$13.50, New York, for heavy melting

steel scrap of strictly high quality. Brokers quote buying prices for the Eastern trade about as follows, to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications)	\$11.75 to \$12.00
Old steel rails (short lengths) or equivalent	12.50 to 12.75
Relaying rails	27.50 to 28.00
Rerolling rails	16.00 to 16.50
Rerolling rails (for export)	19.00
Iron car axles	28.00 to 29.00
Steel car axles (for export)	34.00 to 35.00
No. 1 railroad wrought	17.50 to 18.00
Wrought-iron track scrap	15.50 to 16.00
No. 1 yard wrought, long	13.50 to 14.00
No. 1 yard wrought, short	11.75 to 12.00
Light iron (nominal)	3.50 to 4.00
Cast borings (clean)	6.75 to 7.25
Machine shop turnings (nominal)	4.25 to 4.50
Mixed borings and turnings	4.25 to 4.50
Wrought pipe	10.00 to 10.25
Old carwheels (nominal)	15.00 to 15.50
Malleable cast (railroad)	12.00 to 12.50

Foundries are buying little or nothing, their business apparently being limited. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	\$16.00 to \$16.25
No. 2 cast (heavy)	14.50 to 15.00
Stove plate	11.00 to 11.25
Locomotive grate bars	10.00 to 10.25

British Steel Market

Some Activity in American 2-In. Billets and in Tin Plates

LONDON, ENGLAND, Aug. 8, 1916.

In pig iron the demand for forward delivery persists. Deliveries are closely regulated. Fears are expressed of greater tightness in hematite iron. Deliveries are quite inadequate and export business is curtailed.

American 2-in. billets have sold at £13 15s. In the tin-plate market, 200,000 boxes of oil plates have been placed at 29s. to 30s. Sales later were made at 30s. 9d. The market is very irregular. Quotations are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales 29s. to 30s.	
Steel black sheets, No. 28, export, f.o.b. Liverpool, £26.	
Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.	
Steel rails, export, f.o.b. works port, £10 17s. 6d.	
Hematite pig iron, f.o.b. Tees, about 140s.	
Sheet bars (Welsh) delivered at works in Swansea Valley, £10 7s. 6d.	
Steel bars, export, f.o.b. Clyde, £18.	
Ferromanganese (nominal), £35.	
Ferrosilicon, 50 per cent, c.i.f., £29.	

The Spanish Iron and Steel Situation

The report of the commissioner appointed by the Spanish Government to study the iron and steel situation in Spain was in substance as follows:

In spite of an abundance of high grade iron ore, iron manufacturers have been unable to increase output owing to the scarcity of coal and lack of facilities at blast furnaces. Of nearly 10,000,000 tons of Spanish ore mined in 1913 only about 1,000,000 tons was used in Spain, the rest having been exported. It is urged that more ore be smelted instead of exporting ore and importing finished iron and steel. One suggestion was embodied in a decree, published May 15, prohibiting the exportation of iron and steel scrap. Under present conditions this is to be permitted only when domestic demand is supplied. Nor can finished products be exported unless local needs are covered. Experts will be employed by the Ministry of Public Works to decide whether or not the domestic supply is sufficient. A board will be appointed to fix the maximum selling price of iron and steel, based on wages paid at different mines and on special local conditions.

The plant of the A. Dewes Company, manufacturer of stampings, dies and auto accessories, will be removed from its present location, 241 Centre Street, New York City, to 199 Lafayette Street, on Aug. 15. This change in location was made necessary by the business outgrowing the present quarters.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, 1/4 in. thick and over, and zees 3 in. and over, 2.60c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in. ....	.10
H-beams over 18 in. ....	.10
Angles over 6 in., on one or both legs ....	.10
Angles, 3 in. on one or both legs less than 1/4 in. thick, as per steel bar card, Sept. 1, 1909 ....	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail) ....	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909 ....	.20 to .80
Deck beams and bulb angles ....	.30
Handrail tees ....	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive ....	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive ....	.50
Cutting to lengths, under 1 ft.	1.55
No charge for cutting to lengths 3 ft. and over.	

Plates.—Tank plates, 1/4 in. thick, 6 in. up to 100 in. wide, 3c. to 4c., base, net cash, 30 days, or 1/2 of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers) ....	.10
Boiler and flange steel plates ....	.15
"A. B. M. A." and ordinary firebox steel plates ....	.20
Still bottom steel ....	.30
Locomotive firebox steel ....	.50
Marine steel, special extras and prices on application.	

Gage Extras	Cents per lb.
Rectangular, 1/4 in. thick, over 6 in. wide to 100 in. wide. Base	
Lighter than 1/4 in., up to 3/16 in., up to 72 in. wide. ....	.10
*Lighter than 1/4 in., including 3/16 in., over 72 in. to 84 ....	.20
*Lighter than 1/4 in., including 3/16 in., over 84 in. to 96 ....	.30
*Lighter than 1/4 in., including 3/16 in., over 96 in. to 100 ....	.40
*Lighter than 1/4 in., including 3/16 in., over 100 in. to 102 ....	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide ....	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84 ....	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96 ....	.35
Lighter than No. 8, including No. 10, up to 60 in. wide ....	.30
Lighter than No. 8, including No. 10, over 60 in. to 64 ....	.35
Up to 72 in., not less than 10.2 lb. per sq. ft. will be considered 1/4 in.	
Over 72 in. must be ordered 1/4 in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.	
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.	
Over 72 in., ordered weight 3/16 in., take No. 8 price.	
Over 72 in., ordered weight No. 8, take No. 10 price.	

Width Extras	Cents per lb.
Over 100 in. to 110 in. inclusive. ....	.05
Over 110 in. to 115 in. inclusive. ....	.10
Over 115 in. to 120 in. inclusive. ....	.15
Over 120 in. to 125 in. inclusive. ....	.25
Over 125 in. to 130 in. inclusive. ....	.50
Over 130 in.	1.00

Length Extras	Cents per lb.
Universal plates 80 ft. long up to 90 ft. long. ....	.05
Universal plates 90 ft. long up to 100 ft. long. ....	.10
Universal plates 100 ft. long up to 110 ft. long. ....	.20

Cutting Extras	Cents per lb.
No charge for rectangular plates to lengths 3 ft. and over	
Lengths under 3 ft. to 2 ft. inclusive. ....	.25
Lengths under 2 ft. to 1 ft. inclusive. ....	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in. ....	.30
Circles over 100 to 110 in. (width extra) ....	.35
Circles over 110 to 115 in. (width extra) ....	.40
Circles over 115 to 120 in. (width extra) ....	.45
Circles over 120 to 125 in. (width extra) ....	.55
Circles over 125 to 130 in. (width extra) ....	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft. to 2 ft. inclusive. ....	.55
Circles under 2 ft. to 1 ft. inclusive. ....	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches, not over four straight cuts, inc. straight taper ....	.10
Sketches having more than four straight cuts. ....	.20
Plates sheared to a radius take complete circle extras.	

*Including extra for width.

Wire Rods.—Including chain rods, \$55 to \$60.

Wire Products.—Prices to jobbers effective Aug. 5: Fence wire. Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, \$2.55; galvanized, \$3.25. Galvanized barb wire and staples, \$3.45; painted, \$2.75. Wire nails, \$2.60. Galvanized nails, 1 in. and longer, \$2 advance over base price; shorter than 1 in., \$2.50 advance over base price. Cement-coated nails, \$2.50. Woven wire fencing, 61 1/2 per cent off list for carloads, 60 off for 1000-rod lots, 59 1/2 off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.									
Nos.	6 to 9	10	11	12	12 1/2	13	14	15	16
Annealed	\$2.60	\$2.65	\$2.70	\$2.75	\$2.80	\$2.85	\$2.90	\$2.95	\$3.00
Galvanized	3.30	3.35	3.40	3.45	3.50	3.55	3.60	3.65	3.70

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on black pipe from April 21, 1916, and on galvanized from July 24, 1916, all full weight pipe:

Steel			Butt Weld			Iron		
Inches	Black	Galv.	Inches	Black	Galv.	Inches	Black	Galv.
1/8, 1/4 and 3/8	63	55 1/2	1/4 and 1/2	52	44	1/4 and 1/2	52	44
1/2	67	51 1/2	3/8	53	45	3/8	53	45
3/4 to 3	70	55 1/2	1/2	57	48	1/2	57	48
			3/4 to 1 1/2	60	43	3/4 to 1 1/2	60	43
Lap Weld								
2	65	50 1/2	1 1/4	48	31	1 1/4	48	31
2 1/2 to 6	68	53 1/2	1 1/2	54	38	1 1/2	54	38
7 to 12	65	49 1/2	2	55	39	2	55	39
13 and 14	63 1/2	..	2 1/2 to 4	57	42	2 1/2 to 4	57	42
15	51	..	4 1/2 to 6	57	42	4 1/2 to 6	57	42
			7 to 12	56	41	7 to 12	56	41

Reamed and Drifted			Butt Weld, extra strong, plain ends		
1 to 3, butt.	68	53 1/2	3/4 to 1 1/2, butt.	55	37
2, lap	63	48 1/2	1 1/4, lap	43	25
2 1/2 to 6, lap	66	51 1/2	1 1/2, lap	49	32
			2, lap	50	33
			2 1/2 to 4, lap	52	36

Lap Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
2	63	49 1/2	1/4, 1/4 and 3/8	52	34
2 1/2 to 4	66	52 1/2	1/2	57	43
4 1/2 to 6	65	51 1/2	3/4 to 1 1/2	61	45
7 to 8	61	45 1/2			
9 to 12	56	40 1/2			

Lap Weld, extra strong, plain ends			Butt Weld, double extra strong, plain ends		
2	63	49 1/2	1/4	44	31
2 1/2 to 4	66	52 1/2	1/2 to 1 1/2	47	34
4 1/2 to 6	65	51 1/2			
7 to 8	61	45 1/2			
9 to 12	56	40 1/2			

Lap Weld, double extra strong, plain ends			Butt Weld, double extra strong, plain ends		
2	55	43 1/2	1/4	44	31
2 1/2 to 4	57	45 1/2	1/2 to 1 1/2	47	34
4 1/2 to 6	56	44 1/2			
7 to 8	51	35 1/2			
9 to 12	46	30 1/2			

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets		Cents per lb.
Nos. 3 to 8	.....	2.95 to 3.20
Nos. 9 and 10	.....	3.00 to 3.25
Nos. 11 and 12	.....	3.05 to 3.30
Nos. 13 and 14	.....	3.10 to 3.35
Nos. 15 and 16	.....	3.20 to 3.45

Box Annealed Sheets, Cold Rolled		Cents per lb.
Nos. 17 to 21	.....	2.70 to 2.80
Nos. 22 and 24	.....	2.75 to 2.85
Nos. 25 and 26	.....	2.80 to 2.90
No. 27	.....	2.85 to 2.95
No. 28	.....	2.90 to 3.00
No. 29	.....	2.95 to 3.05
No. 30	.....	3.15 to 3.25

Galvanized Sheets of Black Sheet Gage		Cents per lb.
Nos. 10 and 11	.....	3.25 to 3.35
No. 12	.....	3.35 to 3.45
Nos. 13 and 14	.....	3.35 to 3.45
Nos. 15 and 16	.....	3.45 to 3.55
Nos. 17 to 21	.....	3.60 to 3.70
Nos. 22 to 24	.....	3.70 to 3.80
Nos. 25 and 26	.....	3.85 to 3.95
No. 27	.....	4.10 to 4.20
No. 28	.....	4.25 to 4.35
No. 29	.....	4.40 to 4.50

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from April 15, 1916, are as follows:

Lap Welded Steel		Standard Charcoal Iron	
1 1/2 in.	35	1 1/2 in.	37
1 3/4 and 2 in.	47	1 3/4 and 2 in.	39
2 1/4 in.	44	2 1/4 in.	36
2 1/2 in. and 2 3/4 in.	50	2 1/2 and 2 3/4 in.	42
3 and 3 1/4 in.	55	3 and 3 1/4 in.	47
3 1/2 to 4 1/2 in.	56	3 1/2 to 4 1/2 in.	48
5 and 6 in.	49	5 and 6 in.	41
7 to 13 in.	46	7 to 13 in.	38

Locomotive and steamship special charcoal grades bring higher prices.

1 1/4 in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery							
Copper, New York		Tin,	Lead		Spelter		
Lake	Electro-lytic	New York	New York	St. Louis	New York	St. Louis	
Aug. 26.50	26.25	38.00	6.00	5.85	8.75	8.50	
26.75	26.50	37.75	5.95	5.75	8.62½	8.37½	
26.75	26.50	37.62½	5.95	5.75	8.50	8.25	
26.75	26.50	37.75	5.95	5.75	8.50	8.25	
26.75	26.50	37.75	5.95	5.75	8.50	8.25	
26.75	26.50	37.67½	5.95	5.75	8.37½	8.12½	

NEW YORK, Aug. 9, 1916.

Copper has a better tone, but is yet far from active. Tin is dull and lower, with supply in excess of needs. Lead is easy and does not seem to have been helped by the recent reduction. Spelter is lower in an indifferent market. Antimony has continued to decline, despite two or three good purchases.

New York

Copper.—In the past week there has been a little more doing but the market is far from being active. It is firm, however, and there is a tendency to ask a premium for spot. The resale metal which for some time has been practically making the market is about cleaned up. The trade is optimistic, and it is on this feeling that prices are held more stiffly. In the face of conditions, there has been some discussion as to why the large sheet copper mills should reduce their base price from 37½c. to 35c., as they did in the week. The London market stood yesterday at £124, against £125 a week previous. The exports this month, including yesterday, total 5966 tons. The June imports reached the record-breaking total of 19,500 tons (copper in all forms reduced to fine metal). In six months of this year the imports totaled 103,500 tons, whereas in all of 1915 they amounted to 137,500 tons. Spot and August electrolytic was quoted yesterday at 26.50c., cash, New York, although the real market was more in futures at around 26c. Lake is quoted nominally at 26.75c., cash.

Tin.—Such business as the week brought is hardly worthy of comment. The feature of the situation is that the market is overloaded with tin, especially Banca. One steamer which arrived Aug. 4 brought 1100 tons from Batavia, and this followed other large arrivals. Spot Straits was quoted yesterday at 37.67½c., New York, but Banca was to be had at 36.25c. It is estimated that about 4000 tons of the latter is available, the actual value of which cannot be realized. The arrivals this month total 1887 tons, and there is afloat 3285 tons.

Lead.—The American Smelting & Refining Company on Aug. 2 reduced its New York quotation from 6.50c. to 6c. The independent producers not only followed, but dipped below the new level of the leading interest, and have since been asking 5.95c., New York, with the probability that they would accept 5 points less. The outside quotation at St. Louis is 5.75c. Just after reducing its price the leading interest booked one or two good-sized export orders. The large business that was expected to follow the fixing of the 6c. level failed to materialize, consumers evidently thinking they should be able to buy at less. The exports of the month including yesterday total 429 tons.

Spelter.—The course of this metal has been very disappointing. It is dull and weak, with no signs of bettering in the near future. For the second time in the week, spelter was sold "under the rule" on the New York Metal Exchange, the reason being that buyers had failed to take metal for which they had contracted. Two carloads, or 100,000 lb., of prime Western spelter, en route from Illinois to this city were sold yesterday on the Exchange at 8.15c., St. Louis, which is about 10 points below the market. Spot at New York is quoted at 8.50c., and at St. Louis 8.25c. For November and December about 7.75c. is asked. Of interest is the preliminary report of C. E. Siebenthal, of the United States Geological Survey, on production in six months of this year. Production in that period was 330,922 tons. De-

ducting foreign and domestic exports, and stock on hand June 30, he figures the domestic consumption in six months at approximately 228,700 tons. Of great significance is the statement that stocks, Jan. 1, totaled 14,253 tons, whereas June 30 they had increased to 24,000 tons. He estimated the number of retorts building or contemplated June 30 at 22,188. The exports in the first week of August totaled 1975 tons.

Antimony.—Despite two or three sales of importance, the trend of the market has been downward, and spot Asiatic grades were to be had yesterday at 11c., a level which might have been shaded according to report. Speculative holders of the metal are anxious to dispose of it, even at a loss.

Aluminum.—Quotations are strong at 58c. to 60c. for No. 1 virgin metal, 98 to 99 per cent pure.

Old Metals.—The market continues somewhat active. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	23.00 to 24.00
Copper, heavy and wire	22.00 to 23.00
Copper, light and bottoms	18.00 to 19.00
Brass, heavy	13.50 to 14.50
Brass, light	10.50 to 11.50
Heavy machine composition	17.50 to 18.50
No. 1 yellow rod, brass turnings	13.75 to 14.75
No. 1 red brass or composition turnings	14.50 to 15.50
Lead, heavy	5.75
Lead, tea	5.25
Zinc	7.00 to 8.00

Chicago

AUG. 7.—Despite the advance in the foreign copper market and the high price of electrolytic, the local market for Lake and casting copper is unchanged. Tin, lead and spelter show decided reductions. Scrap metal prices are holding up strongly. We quote: Casting copper, 24.50c. to 25c.; Lake copper, 26c.; tin, carloads, 38.50c., and small lots, 40.50c.; lead, 5.95c.; spelter, 8.50c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 14c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 18.25c.; copper bottoms, 16.50c.; copper clips, 17.50c.; red brass, 16c.; yellow brass, 12c.; lead pipe, 4.50c.; zinc, 5c.; pewter, No. 1, 27c.; tinfoil, 27c.; block tin pipe, 32c.

St. Louis

AUG. 7.—Metals have been weaker, closing to-day as follows: Lead, 5.92½c.; spelter, 8.37½c. to 8.75c., according to delivery; tin, 38½c.; Lake copper, 26c.; electrolytic copper, 25.50c.; antimony, 15c. In the Joplin ore district there was a slump of \$5 in the price of zinc blende, with the average for the week's output of the district \$59 per ton. Calamine averaged \$40 and lead ore \$66. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 7.50c.; heavy yellow brass, 10.50c.; heavy red brass and light copper, 14.50c.; heavy copper and copper wire, 17c.; zinc, 4.50c.; lead, 5c.; tea lead, 3.50c.; pewter, 25c.; tinfoil, 30c.

German Substitutes for Copper

War substitutes for the 6 per cent by weight of copper, which on the average goes into the manufacture of a German locomotive, are reported to be in part as follows: The fire-boxes and stays, previously of copper, are now made of cast iron. All the smoke and steam tubes and the oiling cocks and thin pipes are of weldless drawn steel. For the rod-bracings, axles, grease-boxes and the bracing parts, the difficulty is believed to have been overcome by using cast iron and a special alloy called flange metal which is a mixture of tin, lead and antimony. It is regarded as possibly dangerous to use this metal unless the pins and axle journals were previously bushed with white metal. Cast iron was used for piston-boxes, side valve rods, frames and lubricators, lubricator covers and step bearings. Bronze covered with vulcanized rubber, which was the standard metal for the various handwheels, is being replaced by cast-iron wheels covered with ordinary string or jute fabric. German engineers are now experimenting with a new rolling process for preparing the flange metal referred to, having an equivalent of bronze which will dispense with antimony. A question is raised as to the life of such engines.

Huge Additional Shell Orders

If there are no duplications in the orders as reported, recent business placed in this country by foreign governments has been distributed as follows: American Locomotive Company, 8-in. shells valued at \$15,000,000 and 6-in. valued at \$3,000,000; American Car & Foundry Company, 9.2-in. valued at \$18,000,000; American Brake Shoe & Foundry Company, 9.2-in. valued at \$22,000,000; Midvale Steel & Ordnance Company, 12-in. valued at \$10,000,000; American Steel Foundries, contract valued at \$20,000,000, and the Baldwin Locomotive Works, 6 and 12 in., valued at \$15,000,000, making a total of \$103,000,000.

It is to be noted that all of the munition orders now being placed and those still pending are for the large sized shells. In the beginning the great bulk of the orders were for 3-in. shells, but these are being supplied now by England and France. More recently the allies have begun to use the large size shells in greater quantities, especially in the great offensive movement that is now being pressed.

Important Aeroplane Companies Merged

The Wright-Martin Aircraft Corporation, incorporated in New York with \$5,000,000 preferred stock and 500,000 shares of common stock of no par value, has taken over the Wright Company, 60 Broadway, New York, and the Glenn L. Martin Company of Los Angeles, Cal. The Wright Company has been making motors and automobiles, and the Martin Company aeroplanes. The merger follows the failure of a proposed consolidation with the Curtiss Aeroplane Company.

The Wright Company possesses the original Wright patents and has acquired the American rights for the Hispano-Suiza motor, which has been adopted as a standard by the French and Russian governments. It has contracts with both to supply 450 motors of that type. According to the announcement, the Wright Company will purchase all the stock of the Simplex Automobile Company which it already does not own. At the same time the Wright-Martin Aircraft Corporation will continue to produce Simplex automobiles.

Edward M. Hagar will be president. He now holds that position with the Wright Company. C. S. Jennison will be an associate vice-president with Glenn L. Martin.

Lake Ore Shipments in July by Ports

As shown in THE IRON AGE of Aug. 3, the shipments of Lake Superior iron ore down the Lakes in July broke all records. The totals by ports, with season shipments, and a comparison with 1915 are given below:

Port.	July, 1916.	July, 1915.	To Aug. 1, 1916.	To Aug. 1, 1915.
Escanaba	1,044,368	813,870	3,647,192	2,062,700
Marquette	680,779	567,359	1,834,919	1,114,360
Ashland	1,302,682	708,285	3,506,945	1,870,077
Superior	1,986,631	1,286,402	5,865,546	3,064,002
Duluth	3,012,492	2,414,649	9,338,482	6,710,460
Two Harbors...	1,723,205	1,413,456	5,172,640	3,903,704
Total	9,750,157	7,204,021	29,365,724	18,725,303
1916 increase		2,546,136		10,640,421

Higher Freight Rates from Alabama to California

Announcement is made that the freight rate on pig iron from Birmingham, Ala., to California points (Pacific coast terminals) is to be advanced, effective Sept. 1, from \$10.08 per ton to \$12.32 per ton. Effective the same date, the freight rate on coke is to be advanced from \$9.35 per ton to \$11.35 per ton.

In the last fiscal year, ended June 30, according to statistics recently compiled, Alaska shipped through Seattle, to the markets of the United States, merchandise and precious metals valued at \$65,946,000, of which about \$17,000,000 consisted of gold and silver. The figures for the fiscal year 1916 were double those recorded for 1912.

Iron and Industrial Stocks

NEW YORK, Aug. 9, 1916.

Midsummer dullness has prevailed in the stock market, and prices have shown little change. The discouraging reports from great grain-growing sections in the West and the imminence of the struggle between railroad managers and employees have proved more effective agents of repression than the buoyant developments in industrial circles have been stimulants. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week has been as follows:

Allis-Chal., com.....	21 1/2	Republic, com....	45 1/2 - 47 1/2
Allis-Chal., pref..	74 - 74 1/2	Republic, pref.....	110
Am. Can, com....	54 - 55 1/2	Sloss, com.	42 1/2 - 43
Am. Can, pref.....	110	Sloss, pref.	95
Am. Car & Fdy.,		Pipe, com.	19 1/2 - 19 1/2
com.	56 1/2 - 59 1/2	U. S. Steel,	
Am. Car & Fdy.,		com.	86 - 87
pref.	116	U. S. Steel,	
Am. Loco, com....	67 1/2 - 69 1/2	pref.	117 1/2 - 118 1/2
Am. Loco, pref..	101 1/2 - 102	Va. I. C. & Coke.....	44
Am. Steel Fdries. 50	- 52	Westing. Elec....	56 - 57 1/2
Bald. Loco, com. 70 1/2	- 73 1/2	Am. Rad., com.....	39 1/2
Bald. Loco, pref. 105	- 105 1/2	Am. Rad., pref..	133 1/2 - 135
Beth. Steel, com. 430	- 435	Am. Ship, com....	42 - 48 1/2
Beth. Steel, pref.....	126	Am. Ship, pref..	90 1/2 - 91
Case (J. I.), pref. 85	- 86	Chic. Pneu. Tool.....	67 1/2
Colo. Fuel.....	43 - 44	Lake Sup. Corp..	10 1/2 - 10 1/2
Deere & Co, pref. 91 1/2	- 92	Warwick	9 1/2 - 9 1/2
Gen. Electric....	167 1/2 - 169 1/2	Cruc. Steel, com. 66 1/2	- 68 1/2
Gt. No. Ore Cert. 34 1/2	- 34 1/2	Cruc. Steel, pref. 115 1/2	- 117 1/2
Int. Harv. of N. J.,		Harb.-Walk. Refrac.,	
com.	113 1/2 - 113 1/2	com.	95 1/2
Int. Harv. of N. J.,		La Belle Iron,	
pref.	118 1/2	com.	53 - 54 1/2
Lacka. Steel....	69 1/2 - 71 1/2	La Belle Iron,	
Nat. En. & Strm.,		pref.	129 1/2
com.	21 1/2 - 23	Am. Brit. Mfg.,	
N. Y. Air Brake. 126	- 129	com.	18 - 25
Pitts. Steel, pref.....	99 1/2	Can. Car & Fdy.,	
Pressed Stl., com. 47 1/2	- 48 1/2	pref.	74
Ry. Steel Spring,		Carbon Steel, com....	68
com.	43 - 44	Driggs-Seabury .	95 - 100
Ry. Steel Spring,		Midvale Steel....	60 1/2 - 62
pref.	97 1/2		

Dividends

Deere & Co., regular quarterly, 1% per cent, payable Sept. 1.

The Pittsburgh Steel Company, regular quarterly 1% per cent on the preferred stock, payable Sept. 1.

The American Radiator Company, regular quarterly, 1% per cent on the preferred stock, payable Aug. 15, and 4 per cent on the common stock, payable Sept. 30.

The By-Products Coke Corporation, regular quarterly, 1% per cent and an extra of 1 per cent, payable Aug. 15.

The American Shipbuilding Company, semi-annual, 3 1/2 per cent on the preferred stock, payable Aug. 15.

The American Smelting & Refining Company, regular quarterly, 1 1/4 per cent on the preferred stock, payable Sept. 1, and 1 per cent and an extra of 1/2 of 1 per cent on the common stock, payable Sept. 15.

The National Steel Car Company, Ltd., regular quarterly, 1% per cent on the preferred stock, payable Oct. 16.

The Studebaker Corporation, regular quarterly, 1% per cent on the preferred stock, and 2 1/2 per cent on the common stock, payable Sept. 1.

The Wheeling Mold & Foundry Company, 2 per cent, payable Aug. 25.

The E. W. Bliss Company has issued notice that its \$748,800 first mortgage 6 per cent bonds are called and may be redeemed at the Franklin Trust Company, 166 Montague Street, Brooklyn, on and after Oct. 1, at their par value, together with the 10 per cent premium provided for in the bond, mortgage and deed of trust. This is the only bonded indebtedness outstanding against the company. The bonds were dated April 29, 1902, were to become due April 1, 1932, and were issued to acquire the stock of the United States Projectile Company and several other companies.

The Canadian branch of the International Nickel Company, which is to undertake the manufacture of nickel in Canada, has been incorporated by Britton Osler, room 801 Dominion Bank Building, Toronto, W. A. J. Case and others. A meeting of the representatives of the Ontario Government will shortly be held in Ottawa, when the plans of the company and the question of the selection of a site will be taken up. The new plant will probably be built in units and will provide for a production of 12,000,000 to 15,000,000 lb. of nickel per year at the beginning.

Canadian Production of Iron and Steel

The American Iron and Steel Institute, 61 Broadway, New York, has published its special statistical bulletin No. 4 (1916), giving the production of pig iron, steel ingots and castings and all kinds of finished rolled iron and steel in Canada in 1915 and the production of pig iron in the first half of 1916. An abstract of this statistical presentation is given below:

Production of Pig Iron by Grades, Gross Tons, 1910-1915

Years	Basic	Bessemer	Foundry*	All Other	Total
1910...	365,090	221,494	143,986	9,640	740,210
1911...	413,303	186,274	190,324	34,467	824,368
1912...	489,799	228,742	194,208	129	912,878
1913...	558,524	227,662	225,231	3,701	1,015,118
1914...	331,456	184,053	174,346	16,117	705,972
1915...	660,369	13,714	125,769	25,568	825,420

*Includes ferrosilicon.

Production of Pig Iron by Fuels, Gross Tons, 1910-1915

Years	Coke	Charcoal*	Total	Years	Coke	Charcoal*	Total
1910.	724,174	16,036	740,210	1913.	986,848	28,270	1,015,118
1911.	799,716	24,652	824,368	1914.	690,880	15,092	705,972
1912.	886,506	26,372	912,878	1915.	803,646	21,774	825,420

*Includes pig iron made with charcoal and coke, electricity, etc.

Production of Pig Iron in First Half of 1916

Grades	First Half, 1915	Second Half, 1915	First Half, 1916
Basic	292,556	267,813	388,387
Bessemer	5,238	8,476	12,575
Foundry, ferrosilicon, etc.	59,646	66,123	95,602
All other	9,385	16,183	11,186
Total, gross tons.....	366,825	458,595	507,750

Production of Steel Ingots and Castings, 1910-1915

Years	Ingots	Castings	Total
1910.....	723,002	18,922	741,924
1911.....	768,559	22,312	790,871
1912.....	820,792	32,239	853,031
1913.....	1,006,149	36,354	1,042,503
1914.....	724,596	18,756	743,352
1915.....	873,265	39,490	912,755

The total for 1915 includes about 5000 tons of alloy steel ingots and castings, against about 4800 tons in 1914. In 1915 seven plants made Bessemer, eight open-hearth, two crucible, and three electric steel ingots or castings.

Production of Steel Ingots and Castings by Processes

Years	Open-hearth	Bessemer	Other Kinds	Total
1910.....	542,354	199,570	....	741,924
1911.....	601,074	189,797	....	790,871
1912.....	645,062	207,569	400	853,031
1913.....	768,663	273,391	449	1,042,503
1914.....	556,910	186,158	284	743,352
1915.....	884,736	22,521	5,498	912,755

Production of Finished Rolled Forms by Leading Products

Products	1911	1912	1913	1914	1915
Rails	360,547	423,885	506,709	382,344	209,752
Structural shapes and wire rods	76,617	64,082	68,048	59,050	114,829
Plates and sheets, nail plate, merchant bars, tie-plate bars, etc.	344,760	373,257	392,340	218,125	328,737
Total, gross tons...	781,924	861,224	967,097	659,519	653,318

PRODUCTION OF CUT AND WIRE NAILS

We estimate the total production of iron and steel cut and wire nails in Canada in 1915 as amounting to 1,636,000 kegs of 100 lb., as compared with an estimated production in 1914 of 1,144,000 kegs, an increase of 492,000 kegs.

PRODUCTION OF ANGLE SPLICE BARS, ETC.

The production of angle splice bars, tie-plates, fish plates, and other rail joints and fastenings in Canada by rolling mills and steel works in 1915, all steel, not including spikes, bolts, nuts, and similar fastenings, amounted to 9406 gross tons, as compared with 34,165 tons in 1914, 54,839 tons in 1913 and 52,157 in 1912.

PRODUCTION OF CAST-IRON PIPE

We estimate the total production of cast-iron gas and water pipe and fittings and cast-iron soil and plumbers' pipe and fittings in Canada in 1915 as amounting to 53,700 net tons of 2000 lb., as compared with an estimated production in 1914 of 93,200 net tons, a decrease of 39,500 tons.

COKE BY-PRODUCTS IN 1915

Benzol at Record Figures in Output and Value—
A Remarkable Showing

A bulletin prepared by C. E. Leshner of the United States Geological Survey deals with the outputs and values of various by-products of coke manufacture in the United States in 1915. The total value is put at \$29,824,579, which compares with a previous high water mark of \$17,500,000 in 1914. The table below gives the distribution of values and outputs:

	Quantity	Value	Av. Value
Tar obtained and sold, gal....	138,414,601	\$3,568,384	\$0.026
Ammonia obtained and sold:			
Sulphate, lb.....	199,900,487	5,648,958	.028
Liquor, gal.....	10,626,612	1,240,473	.117
Anhydrous, lb.....	30,002,196	2,978,044	.099
Gas produced, M cu. ft.....	213,667,614	.....	.....
Surplus gas sold or used:			
Illuminating, M cu. ft.....	17,196,426	3,083,311	.179
Domestic fuel, M cu. ft.....	27,590,624	3,158,129	.114
Industrial fuel, M cu. ft.....	39,568,864	2,383,459	.060
Benzol products:			
Crude light oils, gal.....	13,082,678	4,304,281	.33
Secondary light oils, gal.....	182,039	28,731	.16
Benzol, gal.....	2,516,483	1,428,323	.568
Toluol, gal.....	623,506	1,529,803	2.45
Solvent naphtha, gal.....	196,151	46,233	.24
Naphthalene, lb.....	465,865	46,959	.10
Other products*.....	.....	379,491	....
		\$29,824,579	
Coke, net tons.....	14,072,895	48,558,325	3.45
		\$78,382,904	

*Includes breeze, retort carbon, domestic coke and coke dust, and aniline oil.

The value of benzol products rose from less than \$1,000,000 in 1914 to more than \$7,760,000 last year. In 1914 there were 14 benzol plants in the United States, all controlled by one company. Last year 16 additional coke plants were equipped with benzol apparatus. The benzol products obtained amounted to 16,600,657 gal. More than 13,000,000 gal. was reported as crude light oil and had an average value of 33c. Some of the plants have their own stills and refineries, and the pure benzol reported from those sources amounted to 2,516,483 gal., with an average value of nearly 57c., at least three times the value of crude benzol before the war, and 623,506 gal. of toluol, with an average value of \$2.45 a gallon. Crude benzol, which in 1914 was used to some extent for motor fuel, contained the toluol, which is now sold at fancy prices.

More than 138,000,000 gal. of tar was obtained from coke ovens and sold for \$3,568,384 in 1915. The ammonia, of which nearly 100,000 tons was reported as sulphate and the remainder as liquor (10,626,612 gal.) and anhydrous ammonia (30,002,196 lb.), brought a total of \$9,867,475 to the producers. Surplus gas to the extent of 84,356,000,000 cu. ft., valued at \$8,625,000, was sold or used. Of that quantity 17,196,000,000 ft. was used as illuminating gas, 27,591,000,000 ft. as domestic fuel, and 39,569,000,000 ft. as fuel for steam raising, open-hearth furnaces, gas engines, and other industrial purposes. These by-products, which had a total value of \$29,824,579, were obtained by the carbonization of 19,500,000 tons of coal, from which was also obtained 14,000,000 tons of coke.

It is not stated in the bulletin of the Survey what basis is used to obtain the average valuation of \$3.45 for by-product coke. The first impression is that the figure is high, but it has to be considered that by-product coke is generally made at points remote from coal mines and therefore the freight on coal to point of manufacture enters into the valuation of the coke.

The A. P. Green Fire Brick Company, formerly the Mexico Brick & Fire Clay Company, Mexico, Mo., states that it has this year doubled the capacity and output of its plant, and in order better to serve its customers and take care of its greatly increased sales has opened district sales offices as follows: Tulsa, Okla., 312 Gallais Building, with George E. Ford, vice-president, in charge; Chicago, Ill., 208 South La Salle Street, with H. E. Risher in charge; St. Louis, Mo., with Robert H. Miller in charge. The general offices will continue to be located at the plant at Mexico, Mo.

PERSONAL

Fred E. Gage, superintendent of the Central works of the American Steel & Wire Company, Worcester, Mass., has been transferred to the Rankin, Pa., works of the same company. He is succeeded by Edwin F. Barnes, assistant superintendent of the North works, Worcester. Lester W. Perry, superintendent of flat wire departments, succeeds Mr. Barnes and Dennis O'Day assumes the position vacated by Mr. Perry.

C. Lee Cook of Louisville, Ky., gave a dinner on the evening of July 28 in the William Penn Hotel, Pittsburgh, Pa., to A. R. Hunt, former general manager of the Carnegie Steel Company. Mr. Cook is head of the C. Lee Cook Mfg. Company, machine tools, and has a reputation as a lecturer.

C. W. Price, safety expert of the Industrial Commission of Wisconsin since its creation, resigned Aug. 5 to accept the position of field secretary of the National Safety Council, with headquarters in Chicago. He assumes his new duties Sept. 1. He has gained an international reputation by his work in Wisconsin, and it is interesting to note that the National Council has adopted the Wisconsin idea of safety promotion as the basis for its safety program covering the entire country.

Otis C. Friend, sales manager of the Mitchell Motors Company, Racine, Wis., for five years, has resigned to become actively identified with the newly organized United Motors Company, New York, as vice-president and general manager.

H. W. Easterly, general manager of the Sheboygan Gas Light Company, Sheboygan, Wis., has resigned to accept a position as sales and field representative of the Sterling Motor Truck Company, Milwaukee, in Petrograd, Russia. The Sterling Company plans to enlarge greatly its foreign business, which has become an important part of its operations.

Charles E. Hendrixson, for years chief accountant for Robert Wetherill & Co., Inc., builder of heavy machinery, boilers and engines, but now a department of the Sun Shipbuilding Company, Chester, Pa., has been promoted to purchasing agent for the entire corporation. His headquarters will likely be in Philadelphia.

Charles J. Gadd has been appointed chief engineer of the Lebanon plant of the American Iron & Steel Mfg. Company at Lebanon, Pa., a new position created with the introduction of the efficiency system. He was formerly engineer in charge of construction.

Ralph G. Kirk, superintendent of construction for the Steelton plant of the Bethlehem Steel Company, has resigned.

Samuel G. Hoexter of Ann Arbor, Mich., has been made manager of the Engineers' Society of Pennsylvania, Harrisburg, Pa., to succeed Paul Gendell, who has resigned to become manager of the Du Bois, Pa., Chamber of Commerce. Mr. Hoexter, who is a graduate of the Stevens Institute of Technology, was a member of the faculty in the mechanical engineering department of the University of Michigan.

Wilfred G. Astle has been appointed purchasing agent for the Mathews Gravity Carrier Company, Ellwood City, Pa. He was formerly connected with the Canadian Pacific Railway Company, Dominion Power & Transmission Company and Toronto Electric Light Company. Articles by him on storekeeping and purchasing have appeared in some of the leading trade journals.

George T. Snyder, chief engineer at the McKeesport, Pa., works of the National Tube Company, has been transferred to a similar position at the company's Lorain works, Lorain, Ohio. He will be succeeded by A. L. Hoerr, formerly steam and hydraulic engineer at McKeesport.

Walter N. Polakov, formerly superintendent of power for the New York, New Haven & Hartford Railroad, and consulting engineer to the Board of Estimate

and Apportionment of the city of New York, is now directing the foreign trade engineering work of David Vershbinsky, Inc., New York City.

Ralph W. Bingham has resigned as engineer with the Communipaw Steel Company to become associated with the Morris Iron & Steel Company, both of New York City.

George S. Wheatley, instructor of mechanical engineering, University of Pennsylvania, has become associated with the Cambria Steel Company, Johnstown, Pa., in the engineering department.

John W. Morton, formerly connected with the designing department of the McIntosh & Seymour Corporation, Auburn, N. Y., has become chief draftsman of the Baltimore Oil Engine Company, Baltimore.

Henry W. Johnson has been appointed superintendent of the Putnam Machine Company, Fitchburg, Mass. He was formerly efficiency engineer of the Russell Burdall & Ward Bolt & Nut Company, Port Chester, N. Y.

Conrad R. Adams has resigned his position of assistant engineer with the Chandler Motor Car Company, Cleveland, and has been appointed factory manager of the Sibley Machine Tool Company, South Bend, Ind.

O. C. Skinner has been appointed superintendent of the Standard Steel Works Company, Burnham, Pa.

L. H. Mesker has been appointed sales manager of the Kearney & Trecker Company, Milwaukee. He was formerly in charge of the company's interests in Ohio and will continue to supervise this territory through the Cleveland office in addition to having complete charge of the sales department.

C. H. McMillan, manager of the steel department of the Canada Cement Company, Montreal, has resigned. His successor is C. Stendol, who was formerly with the Dominion Steel Corporation and previously with the Algoma Steel Company.

Merritt H. Barnes, formerly attached to the Boston office of the Prentiss Tool & Supply Company, New York, has been appointed manager of the Scranton territory for the company, succeeding S. A. McFadden.

Melbert W. Taber, formerly manager of maintenance and construction of the Packard Motor Car Company, has resigned to accept a position with the Asbestos Protected Metal Company, Pittsburgh, as manager of its Detroit offices, located in the Penobscot Building, Detroit, Mich.

John Flatley, formerly superintendent of the tube mill at Welland, Ont., has resigned to accept a similar position with the Jones & Laughlin Steel Company at Woodlawn, Pa. Previous to this, Mr. Flatley was employed in the tube mills at Youngstown, Ohio.

D. F. Geissinger, formerly in the machine-tool department of the Baird Machinery Company, has resigned to accept a similar position with the Somers, Fidler & Todd Company, Pittsburgh, effective Aug. 1.

Titanium Exports Large

Exports of ferro-carbon-titanium have assumed large proportions since the war started. Exports to England alone, as given by the Titanium Alloy Mfg. Company, are as follows:

1914	170,240 lb.
1915	471,500 lb.
1916 to June 1.....	594,756 lb.

In addition, considerable shipments have been made to Japan. The demand is reported large, but expansion of production is dependent on the question of power.

The Secretary of State of Wisconsin awarded the contract for manufacturing approximately 120,000 pairs of sheet metal license plates for automobiles for 1917 to the Green Bay Cornice & Corrugating Company, Green Bay, Wis., at 9½c. per pair. The State paid a St. Paul contractor 9c. per pair for 1916 plates. In 1915 the plates cost 14c.

Pittsburgh and Nearby Districts

The Brier Hill Steel Company, Youngstown, Ohio, has authorized the construction of two 100-ton open-hearth furnaces, to be completed before the end of the year. The contract cost of furnaces and equipment will be \$750,000 as compared with \$500,000, the cost of two furnaces completed earlier in the year. The new capacity will increase the company's monthly output from 45,000 to 55,000 tons and eliminate it as a merchant pig-iron producer. It now has 10 open-hearth steel furnaces and two 500-ton blast furnaces.

The Apollo Refractories Company, West Apollo, Westmoreland County, Pa., with a capital stock of \$10,000, has been incorporated by Walter A. McGeary, Earl A. McKeever, S. A. McKeever and C. R. Stewart, all of Johnstown, Pa., and J. T. Stewart, Twenty-ninth and Montgomery streets, Philadelphia, to manufacture brick, fire-clay and other refractory products.

The Allen Machine Company, Erie, Pa., will enlarge its plant and install some additional machinery.

The Erie City Iron Works, Erie, Pa., is making a number of improvements to its plant and will replace some of its present old crane equipment with new 25, 20, 15 and 5-ton Niles cranes.

The Fawcett Machine Company, Pittsburgh, Pa., is in the market for a horizontal drilling, boring and milling machine, with floor plate complete, having about 60-in. horizontal and vertical movement, a 5-in. spindle and a 48-in. feed for motor drive, either new or second-hand in good condition.

The Kirk Supply Company, Pittsburgh, will open an office in Cleveland, Ohio, in charge of L. J. Saltsman.

Fire of unknown origin destroyed the machine shop of the Carroll Foundry & Machine Company, Bucyrus, Ohio, Aug. 3. The loss is said to be close to \$100,000.

Stockholders of the Youngstown Iron & Steel Company have re-elected the old board of directors as follows: John O. Pew, Mason Evans, Henry W. Heedy, C. D. Hine, Charles B. Cushwa, Lucius B. McKelvey, G. F. Danielson and C. A. Cochrane.

The W. B. Pollock Company, Youngstown, has received an order from the Midvale Steel Company, Coatesville, Pa., for four new blast-furnace stoves in connection with the previous order for a new 500-ton stack.

The new by-product coke-oven plant of the Youngstown Sheet & Tube Company will be placed in operation as soon as a sufficient number of laborers can be secured.

The Stimple & Ward Company, Pittsburgh, with a capital stock of \$30,000, has been incorporated by George L. Stimple, John C. Ward and William S. Peters, to manufacture electrical machinery.

The Westinghouse Garage & Supply Company, Turtle Creek, Pa., with a capital stock of \$16,000, has been incorporated by J. G. McFeathers and J. S., William L. and R. J. Cunningham, to repair automobiles.

The Pittsburgh Paige Company, Pittsburgh, with a capital stock of \$65,000, has been incorporated by J. M. Sterling, 3134 Avalon Avenue, Pittsburgh; John M. Martin and Max Harris to manufacture and sell automobiles.

The Universal Inspection Company, Pittsburgh, with a capital stock of \$9,000, has been incorporated by Harry G. Clack, 409 Twelfth Avenue, Pittsburgh; James E. Newlands, Crafton, Pa., and Charles N. Turner, Munhall, Pa., to inspect and test structural work, machinery, etc., and to make chemical analyses.

Morris Knowles, Inc., Pittsburgh, with a capital stock of \$20,000, has been incorporated by Morris Knowles, John M. Rice and Maurice R. Schraff, 2541 Oliver Building, Pittsburgh, to engage in a general engineering and erection business.

The J. E. Williamson Company, Bellwood, Blair County, Pa., with a capital stock of \$10,000, has been incorporated by J. E. and C. H. Williamson and H. E. Giant, to manufacture iron and steel castings.

The J. S. Miller Machinery Company, with a capital stock of \$25,000, has been incorporated by John

S. Miller, 1420 Barnesdale Street, Pittsburgh; Eugene S. Reilly and J. Frank McKenna, to manufacture machinery, machine tools and equipment.

Standard Metalwork Company's Growth

The Standard Metalwork Company, Thompsonville, Conn., capitalized at \$300,000, has assumed the liabilities and business of the old corporation of the same name and retained the same officers, who have had control of the affairs of the business of the company for the past ten years. From the early days of the automobile industry this establishment has furnished engine parts, mainly manufactured from tubing, to nearly all of the better makes of cars of the country and at the present time has more unfilled orders on its books than it has ever been able to manufacture in any one single year. With the recent taking over of the adjoining plant of the G. H. Bushnell Press Company and other large increase of capacity, it proposes to expand its output very considerably.

Besides the automobile trade in which it has long been conspicuous, the company has for the past five or six years been successfully manufacturing specialties in war munitions for the United States and South American governments, and since the present war began for European countries. It now has very desirable repeat contracts in this line. On its books are large orders for other metal specialties.

Torrington Manufacturers Unite

The Employers' Association of Litchfield County is the name of an organization formed by manufacturers in and near Torrington, Conn. It will pursue the usual activities of associations of its type, including an employment bureau. Permanent headquarters have been engaged in the building of the Torrington Chamber of Commerce and a salaried secretary will be employed. Among the members are the Hendey Machine Company, Union Hardware Company, Turner & Seymour Mfg. Company, Coe Brass Branch of the American Brass Company, Torrington Company (including the Excelsior Needle Company), Standard Company, Progressive Mfg. Company, and Torrington Mfg. Company. L. G. Kibbe, president Turner & Seymour Mfg. Company, is president; C. H. Alvord, Hendey Machine Company, first vice-president; Thomas W. Bryant, Union Hardware Company, second vice-president; Frank M. Travis, Torrington Electric Light Company, treasurer; and George D. Lyford, formerly with the Union Hardware Company, secretary. Thomaston, Winsted and other towns of the county will be represented in the association.

Increase in Industrial Accidents

High speed in production and the employment of many unskilled men in the demand for workers are blamed for a considerable part of the increase in the number of fatal accidents in Pennsylvania industries, in a report issued by the Department of Labor and Industry covering the first six months of the year. In this period 1136 persons were killed in Pennsylvania manufacturing plants, compared with a total of 1203 for all of 1915.

A report made by the Maryland State Industrial Accident Commission also shows a large increase in accidents. The report shows that in the twelve months ended Nov. 1, 1915, there were 20,469 accidents in the State, 121 of them fatal, while in the nine months from Nov. 1, 1915, to Aug. 1, 1916, there were 22,309, of which number 127 were fatal.

After a run of 3 years, 7 months and 18 days, during which time it produced 598,245 tons of pig iron, D blast furnace at the South Bethlehem plant of the Bethlehem Steel Company has been blown out for repairs. An effort is being made to have this work completed inside of six weeks instead of the two or three months usually required. Work on the remodeling of B stack, which is being brought up to 500-ton capacity, is being pushed.

OBITUARY

Thomas J. Drummond

Thomas J. Drummond of Montreal, long prominent in the Canadian steel trade, died at his summer home in Castine, Me., Aug. 6. He had been in ill health for several years and since 1912 had not taken an active part in several of the enterprises in which he had been a leading figure. Mr. Drummond became well known as a member of the firm of Drummond, McCall & Co., Montreal iron and steel merchants, which was established in 1881 by George E. Drummond and James T. McCall. He organized the Montreal Car Wheel Com-



THOMAS J. DRUMMOND

pany, the Canadian Iron Furnace Company of Montreal and Radnor Forges, Quebec, and the Drummond-McCall Pipe Foundry Company. His most important activities in steel manufacture were in connection with the Lake Superior Corporation, of which he was president; the Algoma Steel Company, its subsidiary, at Sault Ste. Marie, Mich., the Algoma Central Railway and the Canada Iron Corporation. He was a director of the American Iron and Steel Institute, and in its earlier history took a prominent part in its New York meetings. In 1911 he was one of the Institute's representatives in the international steel meeting at Brussels, Belgium. Mr. Drummond was a director of the Royal Bank of Canada, the Western Canada Power Company, the General Accident Insurance Company, the Canadian Car & Foundry Company and the Cockshutt Plow Company. He was born in the County of Leitrim, Ireland, in 1860, and was educated in the public schools of Montreal.

Hugh W. Adams

Major Hugh White Adams, for many years prominent in the pig-iron trade of New York City, died Aug. 7 at his home in Yonkers, N. Y. He was born March 27, 1843, at Barbourville, Ky. In 1861, when but 18 years old, he was offered a commission in the Union Army but declined as he had no military training. He enlisted in July, 1861, as a private, and later was promoted to sergeant-major and then to adjutant. For bravery in assuming command of his regiment and moving it under fire at Vicksburg, Miss., he was made major in February, 1863. At Fort Gibson, May 1, 1863, at the age of 20, he commanded his regiment in battle. Major Adams's connection with the iron trade dates

from 1874 when he opened an office for the sale of pig iron at 56 Pine Street, New York. He removed in 1892 to 15 Beekman Street, where his office remained until his death. He was best known in his representation of Southern pig-iron producers, particularly the Sloss-Sheffield Steel & Iron Company, whose iron he sold in the Eastern market for many years. In fact, Major Adams was largely instrumental in introducing Alabama pig iron in the Eastern market. He also had the sale for a time of the pig iron of the Tennessee Coal, Iron & Railroad Company. Among Northern furnaces which he represented some years ago were Wharton, Macungie and Musconetcong, and he also for a time sold the pig iron of the Reading Iron Company.

C. F. AUGUST SCHLUTTER, president Schlutter-Zastrow Machine Company, 1404 to 1410 Thames Street, Baltimore, died in a local hospital Aug. 2, aged 39 years. For a number of years he was connected with the Calvert Machine Company, and last April organized the Schlutter-Zastrow Company. A few weeks after assuming charge of the factory of the new company he was taken ill, but recovered somewhat, and was able to resume his duties, but only for a short time.

GEORGE B. ROBERTS, Cambridge, Mass., for many years a manufacturer of steam boilers, died at Marblehead, Mass., Aug. 3, aged 82 years. He was a partner in the old firm of Kendall & Roberts, and later organized the Roberts Iron Works Company, Cambridgeport.

CHARLES D. PECK, shop superintendent for the H. K. Porter Company, Pittsburgh, and his wife were killed when a train struck their automobile at Westfield, N. Y., Aug. 4.

Possible Taxes on All Metals

WASHINGTON, D. C., Aug. 8, 1916.—The Senate Finance Committee has decided to reconsider the action by which the House provision imposing a tax on the production, smelting and refining of copper was recently eliminated from the omnibus revenue bill now under consideration. It is proposed in lieu of abandoning the copper tax entirely to provide a tax on all metals entering into the manufacture of munitions, including iron and steel. These taxes would be imposed in addition to the tax on the profits of munition makers provided for in another section of the pending bill.

No feature of the revenue bill, as passed by the House, has provoked so much controversy as the special tax on copper, and it is now probable that this feature of the bill will not be definitely determined by the majority members of the Finance Committee until after the final caucus of the majority Senators. Inasmuch as this question is under consideration by a special subcommittee and by the full Finance Committee and will be taken up at each of the series of caucuses to be held before the bill is finally reported to the Senate, statements as to the ultimate determination of the matter that may appear in the daily press from time to time should be received with due caution.

It is expected that the Finance Committee will be ready to report the revenue bill to the Senate some time next week but its consideration is likely to be deferred until after the Administration's shipping bill is disposed of.

W. L. C.

The Northeast Coast Institution of Engineers and Shipbuilders, Newcastle-on-Tyne, England, has appointed a research committee, which has made a start with its work by acceding to the request of a British firm to investigate and carry out exhaustive tests of apparatus having for their object the more economical production of power by marine steam engines. By its action, the society named will be the first of the influential British technical institutions actively to promote the progress of the industries with which its members are associated by officially making and recording tests of new apparatus developed by them.

The Buffalo Union Furnace Company, which blew out its A furnace at Buffalo for relining in July, expects to have it in operation by Sept. 1.

STRIKES AND SETTLEMENTS

Milwaukee Developments

MILWAUKEE, AUG. 8.—(By Telegraph.)—The leaders of the machinists' strike called out the men of the Chain Belt Company to-day, but only 35 walked out. Yesterday the National Brake & Electric and the Wisconsin Motor Mfg. companies were re-struck, a total of 22 leaving. Secretary William J. Fairbairn of the Metal Trades and Founders' Association says no change has been made in the policy of employers. All are operating with much less inconvenience than anticipated.

Activity of strike leaders at Milwaukee during the week ended Aug. 5 was of less proportions than in any weekly period since the first walkout on the 8-hr. demand was called on July 18. Enthusiasm appears to be waning, owing to acknowledged dissatisfaction in the ranks of the strikers over the alleged lack of preparedness and organization. Further strikes were declared in the shops of the Bucyrus Company, South Milwaukee, on Wednesday and the National Brake & Electric Company, Milwaukee, on Friday on the claim that the shops affected attempted to put men on work received from shops with men on strike. No walkouts were declared Thursday and none on Saturday. Strike leaders claim that approximately 4000 men from 20 shops walked out between July 18 and Aug. 5. An employment bureau has been established by the union leaders and assessments are now being levied on other divisions of the federated trades for the benefit of striking machinists.

Ohio Labor Conditions

In Cincinnati the machinists' recent strike has proved a complete failure. The majority of shops are now working more men than they were the day before the strike was called.

In Dayton machinists last week made demands on about 40 plants. These demands covered the usual 8-hr. day, with time and one-half for over hours and double time for holidays. Recognition of shop grievance committees is also demanded, which, if granted, would mean a tacit recognition of the union. No strike has yet been called, and it is reported on good authority that the International Association of Machinists promised to give its moral support to the movement but refused financial assistance, so that no serious trouble is feared.

At Springfield and Columbus conditions are unchanged. The few shops previously affected in these cities have been able to fill the places of the men who went out.

Charles Bendheim, commissioner of conciliation of the United States Department of Labor, is in Youngstown, endeavoring to harmonize the striking machinists and their employers.

San Francisco Conditions

The law and order committee of the Chamber of Commerce of San Francisco has decided to assist structural steel erectors in their efforts to open their plants on an open-shop basis "to the extent that they need support." The erectors will take back union or non-union men without discrimination, and there will be no change in wages or hours. The employees of the structural steel firms went on strike July 10, demanding an 8-hr. day at the same wages now paid for 9 hr. On July 25 the Building Trades Employers' Association, with which the structural employers are affiliated, demanded of the Building Trades Council that all strikers return to work under the old conditions on or before Friday morning, July 28. The strikers did not return, and therefore the declaration has been made for the open shop.

Eastern Pennsylvania Note

Negotiations under way for several weeks between the machinists of the Reading Railroad shops in Pottsville and the company's officials came to a satisfactory close Aug. 2, when the men were awarded a wage increase of 5 per cent and time and quarter time for over

hours. This is the second 5 per cent increase they have received this year, the working time of all the shop employees having been cut from nine to eight hours without a reduction in wages.

Engine Works to Be Erected in Scotland for Women

A metal-working plant to admit women operatives only is to be erected in Scotland, according to *The Engineer*, of London. It is said the works will be in operation by early autumn and at first parts for aeroplane engines will be made. Later on the plan is to build complete aeroplane engines.

The works themselves will be open only to well-educated women between the ages of 20 and 35 who show a bent for mechanics, and in choosing the workers preference will be given to widows and daughters of officers in the army and navy.

One feature of the working of the scheme is that the amount of remuneration given will be decided by means of examinations. The first six weeks are to be regarded as a probationary period, during which payment will be at the rate of £1 per week. At the conclusion of that time those who have shown that they do not have the necessary mechanical instinct will be told that they cannot remain, and with the others agreements will be made to work for certain periods. The examinations are to be held at the end of each six months, and on the result of these the wages are to be gaged. The actual amounts to be paid are not yet definitely settled, but it is apparently probable that the lowest will not be less than 25s. per week, and that as much as £250 a year may be reached. There are to be night and day shifts, each shift being divided into two periods of 4 hr. each. The interval between the two halves of the day shift will be 2 hr. long, and during one-quarter of it technical instruction will be given in classes which will have to be attended by those in their probationary period, though attendance will be optional for those who have passed it.

Lake Seamen's Wages Raised

At a meeting of the board of directors of the Lake Carriers' Association in Cleveland, Aug. 3, all Lake seamen below licensed officers were granted a raise of \$10 per month in wages for the period from Aug. 1 to Oct. 1. The directors recommended that the question of additional remuneration for licensed officers be taken up at a later meeting of the vessel owners, and that they be given proper recognition for their efficiency during the heavy freight movement of this season. This recognition will probably take the form of a distribution of earnings among the licensed officers at the close of the season.

The American Uniform Boiler-Law Society, which was organized to bring about the legal adoption in the different States of the country of the boiler code drawn up by the American Society of Mechanical Engineers, held a meeting of the administrative council on July 11 in New York City. The council was continued with the same representatives of different classes of boiler manufacturers and of the large users, of handlers of boiler materials and of the boiler insurance companies as have directed its affairs up to date. Thomas E. Durban, general manager Erie City Iron Works, Erie, Pa., thus continues as chairman of the council.

Frederic B. Stevens, of Detroit, has published as a pamphlet with an odd cover an address he delivered before the Western Box Manufacturers' Association, a talk before the Rotary Club, Detroit, a contribution to the *Michigan Investor* on "Giving the Credit and Getting the Money" and two or three other articles and sketches from his pen, all being grouped under the title, "That and This." Mr. Stevens's engaging style is familiar to members of various manufacturers' organizations that have visited Detroit, and the present publication adds to the reputation he has gathered as an after-dinner speaker.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

VARIATIONS FROM SPECIFICATIONS IN MANUFACTURING PARTS.—A buyer of mechanical parts specially manufactured for him will not be heard to complain of variations from the specifications as to dimensions, if they are so slight as to be inconsequential, but there must be literal conformity to the specifications when that is necessary to apply the parts to their intended use. If the buyer accepts parts which do not conform to the specifications, he is entitled to deduct a reasonable amount to cover the cost of making them so conform. Or, if he rejects the delivery, he may recover the excess of the cost of substitute parts purchased elsewhere above the price at which the defaulting manufacturer agreed to sell. (Standard Roller Bearing Company vs. Hub Machine Welding & Contracting Company, 61 Pennsylvania Superior Court Reports, 14.)

EMPLOYER'S DUTY CONCERNING FOUNDRY ELEVATORS.—In an action against a manufacturing company for injury to its assistant foreman in the melting department of the company's foundry, caused by falling of a newly installed foundry elevator, it is decided that he assumed the risk involved in loading the car with a heavy load of pig iron, knowing that the elevator had not been, but was about to be, tested. The company cannot be found to have been negligent in the selection of a bolt, breaking of which caused the elevator to fall, when it is shown that the master mechanic examined the bolt before it was selected, and pronounced it safe; there being no discoverable defect in it. As to the elevator, the company discharged its full legal duty to take reasonable precautions to make it reasonably safe for the employees required to ride on it, by providing for a test before putting the elevator to use. (Vermont Supreme Court, Anderson vs. Howe Scale Company, 97 Atlantic Reporter, 992.)

CONTRIBUTORY NEGLIGENCE CONCERNING TRAVELING CRANES.—An employee who places his hand on the runway of a traveling crane in a foundry, while engaged at work nearby, knowing that the crane is in constant use, is guilty of contributory negligence which bars his right to recover damages for injuries sustained in passage of the crane over his hand. (Pennsylvania Supreme Court, Lowry vs. Baldwin Locomotive Works, 97 Atlantic Reporter, 1049.)

RESERVATION OF TITLE IN SELLER OF GOODS.—Under a contract for sale of a pump, etc., reserving title in the seller until payment of the agreed price, the buyer's act in affixing the articles to leased land did not prevent the seller from recovering possession of them, on the buyer failing to pay therefor. And where the contract is evidenced by a note, with the articles enumerated on the back, the buyer will not be permitted to contradict the written reservation of title by showing a claimed verbal understanding that there was to be no such reservation. (Arkansas Supreme Court, Fears vs. Watson, 187 Southwestern Reporter, 178.)

BUYER'S INSOLVENCY AS GROUND FOR RECOVERING GOODS.—Although a seller of goods on credit may recover possession of them on showing that the buyer purchased them with fraudulent intention not to pay for them, the mere fact of the latter's insolvency will not warrant a finding of such fraudulent intent. The buyer's mere omission to disclose his impaired financial condition does not amount to such fraud as justifies rescission of the contract, unless he is guilty of having made misrepresentations concerning his pecuniary responsibility, or bought without hope or intention of being able to pay. (Massachusetts Supreme Judicial Court, Phinney vs. Friedman, 113 Northeastern Reporter, 285.)

EMERY WHEEL ACCIDENTS.—In affirming a judgment against an employer for injuries to an operator of a revolving emery wheel, attributed to the employer permitting the rest on the machine to become loose, whereby plaintiff's hand came in contact with the wheel, and in permitting the wheel to become and remain irregular in shape, thereby also tending to cause such contact, the Indiana Appellate Court holds that it was open to the jury to find that the defects had remained so long that

the employer was chargeable with knowledge of their existence, and with negligence in failing to repair the defective conditions. (Standard Steel Car Company vs. Martinez, 113 Northeastern Reporter, 244.)

BUYER'S RIGHT TO COUNTERCLAIM DAMAGES FOR DELAY.—A clause in a contract for furnishing equipment, to the effect that the seller should not be liable for delays occasioned by fires, strikes, etc., nor "in any event, for consequential damages," precluded the buyer from asserting a counterclaim for special damages attendant upon the seller's delay, although the delay was not caused by fire, or strike, etc. (Virginia Supreme Court of Appeals, Washington & Old Dominion Railway vs. Westinghouse Electric & Mfg. Company, 89 Southeastern Reporter, 131.)

OVERLOADING OF VESSELS.—A steamship company was negligent and not entitled to limitation of liability for loss of a cargo of steel rails lost in a gale on Lake Superior, with the vessel on which they were loaded, where the vessel was designed for a draft of only 14½ ft., and yet was loaded to a depth of 18 ft., leaving freeboard of not more than 2 in. (United States District Court, Eastern District of Michigan, The Benjamin Noble, 232 Federal Reporter, 382.)

INFRINGEMENT OF PATENTS.—Innocence of intention is no defense to an action for patent infringement. (United States District Court, Eastern District of Michigan, Kawneer Mfg. Company vs. Toledo Plate & Window Glass Company, 232 Federal Reporter, 362.)

MACHINERY TRADE NAMES.—A person named Deister, on disposing of his interest in the "Deister Concentrator Company," was not precluded from establishing a competing business under the name "Deister Machine Company," there being nothing to show that any confusion in the public mind was occasioned thereby or that any fraudulent intent existed to produce confusion to the first mentioned company's disadvantage. Every person is entitled to use his own name in trade, so long as it is not fraudulently used to divert patronage from an established rival business. But when the name under which machinery is sold and the circumstances of selling it are such as to have a manifest tendency to deceive purchasers, to the disadvantage of a competitor who first adopted the same or a similar name, the latter will be entitled to enjoin continued use of the name as constituting unfair competition, regardless of whether there is a showing of actual intent to defraud. . . . No inflexible rule can be stated as to what conduct will or will not constitute unfair competition. Each case must be decided according to its own peculiar state of facts. (Indiana Appellate Court, Deister Concentrator Company vs. Deister Machine Company, 112 Northeastern Reporter, 906.)

Tests of a Bettington Boiler

Comparative tests of a Bettington boiler and of a Babcock & Wilcox boiler of about the same size are reported in a paper describing the electric power station at Johannesburg, South Africa, read before the South African Institution of Engineers by John J. Dobson. The Bettington boiler, which was illustrated in THE IRON AGE, Oct. 2, 1913, uses pulverized coal as fuel. The fuel is blown into the combustion space by means of hot air and burns as a vertical Bunsen flame. The power required to pulverize the coal and to supply the blast has been deducted in determining the net calorific efficiencies given below.

Results of Tests on the Robeson-Bettington Boiler and the Babcock and Wilcox Marine Type Boiler

Item	Bettington Tests		Babcock & Wilcox Tests	
	Tests	Results	Tests	Results
Duration of test, hr.	9.8		10	
Gage pressure, lb.	173.7		161.9	
Feed temperature, deg. Fahr.	65.5		64.7	
Steam temperature, deg. Fahr.	510.3		546	
Water evaporated per hr., lb.	31,561		29,379	
Coal consumed per hour, lb.	4,477		4,182	
Water evaporated per 1 lb. coal (as fired), lb.	7,050		7,014	
Evaporative equivalent, lb.	9,049		9,149	
Evaporative equivalent from and at 212 deg. Fahr. (dry), lb.	9,464		9,868	
Efficiency on gross calorific value	78.6		77.4	
Percentage auxiliary power	3.8		1.0	
Net efficiency on gross calorific value	75.6		76.8	
Efficiency on net calorific value	81.4		80.0	
Net efficiency on net calorific value	78.3		79.1	

Machinery Markets and News of the Works

QUICK DELIVERIES WANTED

War Buying Not Confined to Big Lathes

Large Group of Automatics Bought—General Conditions Good, but Large Lists Are Few—Hot Weather Slight Detriment

In addition to the large groups of big engine lathes which shell contractors will require for 6 to 12-in. shells, there will be a good movement also for cutting-off machines, and for turret lathes for the manufacture of base plugs and nose pieces. The New York market notes the purchase of 60 machines for cutting steel bars to the required lengths. The Baldwin Locomotive Works is making inquiry for 26,000 tons of 6 $\frac{3}{8}$ -in. bars, which is conclusive evidence that it has an order for 6-in. shells. Where lathes have been bought, or inquired for, emphasis has been laid on the quick delivery required, usually two months. A Brooklyn company which has a new fuse contract has purchased 150 automatic machines, of which it already had a large number.

The general domestic demand continues good, although minus large inquiries. Machine tool builders are rushing to catch up on deliveries, and while the hot weather has interfered somewhat, the output of the month of July was greater than some expected.

The Cleveland market is fairly active considering the season. Cincinnati finds that Canadian business is slowing up, but English buyers have been active, taking lathes, mostly.

The demand on gas engine builders in Milwaukee is so heavy that their midsummer slack season will be a short one. Orders from the makers of farm machinery are especially heavy. In the first seven months of this year new building construction in Milwaukee was approximately 57 per cent heavier than in the same period of 1915.

Milling and grinding machines lead the demand in Detroit, although there is a fair movement of miscellaneous machinery. Lack of housing facilities is partly responsible for a shortage of labor in Detroit.

Mining operations in New Mexico and Arizona are creating a heavy call for equipment in Texas. San Francisco reports that machinery is required for many new plants. The Pacific Northwest is suffering from a car shortage.

New York

NEW YORK, Aug. 9, 1916.

Interest continues to be centered to a large extent in the orders which shell contractors have placed for heavy lathes, the value of which will aggregate several hundred thousand dollars. The orders have been largely confined to engine lathes, although a considerable number of cutting-off machines have been bought, and it is probable that turret machines will be purchased for the manufacture of base plugs and nose pieces.

Detailed information as to the distribution of the orders for 6 to 12-in. shells continue to come out slowly. The order reported to have been closed by the American Brake Shoe & Foundry Company calls for 420,000 9.2-in. So far the E. W. Bliss Company and the American Locomotive

Company have been the largest purchasers of machine tools for large shell work. A Brooklyn company which has a new order for fuses has placed an order for 150 automatic machines.

Aside from the war demand, business has been good, and some attractive sales of miscellaneous tools have been made. The General Electric Company has been a large purchaser of late, and has not completed its buying. The American Type Founders' Company, Jersey City, N. J., is extending the facilities of its Kelly Press Department, the Hyatt Roller Bearing Company has been in the market, likewise the Davis-Bournonville Company, Jersey City. The Pennsylvania Railroad has ordered two large turret lathes, the Baltimore & Ohio three or four and the New York Central two. Altogether the daily sales sheets of the larger dealers make a very impressive showing, and at the rate orders are being booked deliveries promise to keep as far away as ever. In many cases inquiries cannot be handled because of the prompt deliveries which are wanted.

The International Elevating Company, Produce Exchange Building, New York, has purchased from the American Coal Company a plot in Jersey City, 100 x 200 ft., including riparian rights and pier facilities. The company operates floating grain elevators in New York harbor and is reported to plan the erection of a repair shop upon the site.

The Canadian Car & Foundry Company has contracted for sixteen new buildings to be added to its munition plant at Kingsland, N. J.

The Metropolitan Motors, recently incorporated in Delaware with a capital stock of \$1,000,000, has purchased business and plant of the White Star Motor & Engineering Company, 55 Liberty Street, New York, manufacturer of motor trucks, which operates a plant at 759 Third Avenue, Brooklyn. The new company will produce a one-ton truck in quantity, which will undoubtedly necessitate greatly increased manufacturing space and equipment as the plant has been running at capacity, producing two, three and five-ton units. William C. Mack, one of the founders of the Mack Brothers Motor Car Company, is president, and Charles W. Paget is secretary. The officers, with George A. Baker, formerly editor of the *Railroad Magazine*, Bernard Hoersgen, formerly president of the Krefeld Steel Company and the White Star Motor & Engineering Company; and S. Hirsch, vice-president of the Lock Joint Pipe Company, New York, compose the board of directors.

The P. Trainor Company, 116 Greene Street, Brooklyn, recently took over the steam boiler works of P. Trainor & Co. It has acquired adjoining buildings, which it has added to its plant, and has installed new machinery for the manufacture of boilers, tanks, stacks, and for pipe fitting and oxy-acetylene welding. The company was recently incorporated with a capital stock of \$10,000. C. Trainor is president and treasurer; L. B. Concannon is vice-president, and J. W. Holmes is secretary.

The C. & L. Machine Company, 61 Murray Street, New York, recently incorporated with a capital stock of \$50,000, has established works at 855 Fourth Avenue, Astoria, L. I., for the manufacture of wrapping, packing and other automatic machinery. Francis D. Canfield, 82 Wall Street, New York, is president; Frank W. Lev is vice-president and Hilario Escobales is secretary.

The Buffalo Metal Products Mfg. Company has completed a temporary manufacturing plant at Humboldt Parkway and East Delavan Avenue, Buffalo, and is manufacturing pressed steel parts. The company expects to increase its capacity shortly by putting up an additional concrete or brick structure. It was recently incorporated with a capital stock of \$50,000. D. Reid is president.

The Wappler Electric Company, 173 East Eighty-seventh Street, New York, has taken over the business of the Wappler Electric Mfg. Company and will manufacture electro-medical apparatus. R. H. Wappler is president; Charles Fayer, vice-president; H. E. Ludewig, secretary and F. H. Wappler, treasurer. The company was recently incorporated with a capital stock of \$750,000. The officers, with John Hammer, compose the board of directors.

The Planographic Equipment Company, 52 Duane Street, New York, controls the manufacturing and selling rights to perfecting web and sheet-fed offset presses and also controls the same rights to the line of plate-making and plate-developing appliances. At present a full line of associate plate-making machines is in process of building and a large web-

perfecting offset press is being built by the Goss Printing Press Company in Chicago. Allen S. Page is manager.

The Excelsior Steel Ball Company, Buffalo, E. A. Jones, manager, has let contract for a foundry addition, 50 x 155 ft., to its plant, located at the New York Central Railroad and Military Road, North Buffalo.

The U. S. Metal Refining Company, Roosevelt, N. J., has awarded contract to Charles Flocken, 123 Liberty Street, New York, for the construction of a two-story laboratory building, 50 x 115 ft.

The Bellco Specialty Company, North Tonawanda, N. Y., has been incorporated by Gustav and Louis Belling and Charles J. Tolkstadt to manufacture wagons and sleds.

The Empire Foundry Company, Port Chester, N. Y., has been incorporated with a capital stock of \$5,000 to manufacture cast-iron pipe, gratings, manhole covers, etc. W. A. Braun, J. Fuchs and B. Mills, Port Chester, are the incorporators.

The New York Graphite Company was erroneously credited in THE IRON AGE of July 20 with the purchase of a tract of land on the Niagara River near Buffalo. The land was purchased by the Acheson Graphite Company, Niagara Falls, and comprises 18 acres instead of 20 acres. As far as known, no company named the New York Graphite Company has bought land or been organized.

The Strong Machinery & Supply Company, 21 Walker Street, New York, is in the market for a second-hand boiler for a working pressure of 125 to 150 lb.

Marvin Briggs, Inc., 167 Sixth Street, Brooklyn, N. Y., is in the market for surface and jet condensers of large size.

The American Locomotive Company, Schenectady, N. Y., has completed plans for a one-story wheel shop, 30 x 245 ft., to cost about \$20,000. W. M. Dalton is manager.

The Southard-Robertson Company, manufacturer of hot-air heaters, 257 Water Street, New York, is having plans prepared for the erection of a two-story factory building, 100 x 115 ft., to be added to its plant at Peekskill, N. Y. B. S. King & Sons, Inc., 103 Park Avenue, New York, is the architect.

The Bosch Magneto Company, 233 West Forty-sixth Street, New York, has awarded contract to the Casper-Ranger Construction Company, 101 Park Avenue, New York, for a one-story addition, 36 x 46 ft., to its plant at Plainfield, N. J.

New England

BOSTON, MASS., Aug. 7, 1916.

The Bridgeport Crucible Company, Bridgeport, Conn., together with its subsidiary, the Taunton Crucible Company, Taunton, Mass., has been purchased by the Buffalo Copper & Brass Rolling Mill, Buffalo, N. Y. It is understood that the Buffalo company, the largest single user of crucibles in this country, it is stated, has been negotiating for the purchase of the Bridgeport business for some time to protect its crucible supply. The present output of the Bridgeport plant is 1800 crucibles a day and its yearly sales are reported to exceed \$4,000,000. The Bridgeport Crucible Company was founded in 1887 by W. T. Macfarlane, who will continue for a period with the new owners in an advisory capacity. His son, W. A. Macfarlane, will continue as active manager of the plant.

H. H. Ashenden, Waterbury, Conn., is seeking power presses and other sheet-metal tools in good condition.

The Barnett Drop Forging Company, Easthampton, Mass., is in the market for a 35 x 50-ton press, plain or geared.

The Revere Rubber Company, Chelsea, Mass., is in the market for a new or second-hand centrifugal feed pump of 100-gal.-per-min. capacity, to operate against 200-ft. head, direct-connected to a 3-hp., 60-cycle, 550-volt motor.

The Connecticut Telephone & Electric Company, Meriden, Conn., has awarded a contract for an addition to cost \$25,000 to be erected on Britannia Street.

The New York, New Haven & Hartford Railroad has applied for permission to build an engine house and repair shop in the White Street yards, Danbury, Conn. The repair shop will be 48 x 148 ft., one story.

The National Company, Waterbury, Conn., has awarded a contract for an addition, 70 x 150 ft., one story, with muffler room, 50 x 70 ft.

Work has been started on the new factory at 118 Race Street, Holyoke, Mass., for the Holyoke Valve & Hydrant Company. The building will be 133 x 217 ft., three stories.

Homer F. Livermore, Inc., Boston, Mass., has been incorporated with capital stock of \$50,000 to manufacture electrical appliances. The incorporators are Homer F. Livermore, president and treasurer; F. E. Babcock and A. E. Borden.

The Stanley Works, New Britain, Conn., have had plans drawn for a new building, 40 x 70 ft., three stories. The first floor will be arranged for hospital and rest rooms, the second floor as a lunch room, and the third floor for an assembly hall.

The Revere Foundry Company, Revere, Mass., has been incorporated with capital stock of \$5,000. The directors are Edward H. Tibbetts, president; George A. Lloyd, Chelsea, treasurer, and D. Carey.

The Simonsville Mfg. Company, Waterbury, Conn., has been incorporated with capital stock of \$25,000 to operate a foundry. The incorporators are Charles V. Roller, George A. Carney and Roderick J. Perrault.

The City Iron Foundry Company, Lowell, Mass., has been incorporated with capital stock of \$10,000. The directors are A. J. Harris, president; James J. Norton, 290 Plain Street, Lowell, treasurer, and M. E. Harris.

Philadelphia

PHILADELPHIA, PA., Aug. 7, 1916.

Some interesting sidelights on the labor problem have been noted in the Philadelphia territory of late. Two thousand men are needed by munition factories in that vicinity. The Remington Arms Company wants 1000 men at its plant at Eddystone, and to-day opened an employment office on North Fifteenth Street. The men must be total abstainers.

The Du Pont Powder Company at Gibbstown also is in the field for hundreds of men and makes the additional condition that "floaters" need not apply.

Chester, Pa., still faces a labor problem, despite the fact that 25,000 people have found work in the nearby industrial towns in the past year. Manufacturers from this district have invaded other cities and have brought workers here by the carloads, and out-of-town companies are now invading this section looking for help.

Owing to the scarcity of labor in Allentown, the Traylor Engineering & Mfg. Company, which is spending \$800,000 in extensions this summer, has offered 20c. an hr. for common laborers. A great many college students have taken to this work to earn money during vacation.

Work on the new Sun Shipbuilding Company plant at Chester, Pa., which will cost in the neighborhood of \$2,500,000, is progressing rapidly. The largest building will be 506 x 880 ft. Most of the structural work on this has been completed. Work is also moving rapidly on the five shipways, each of which will be 600 ft. long. There are to be several other large buildings and the work on most of them is well under way. A fabricating shop and compressor shop will be built and in it will be an erecting shop and mold loft.

Fire in manufacturing buildings owned by the Empire Brass Company at Stroudsburg, Pa., Aug. 1, is reported to have caused a damage of about \$100,000. The Cameron Engineering Company, East Stroudsburg, Pa., manufacturer of cranes, transfer trucks, I-beam trolleys, etc., which occupied part of the premises, has been compelled to seek temporary quarters, in which it is continuing its business as usual. It will, however, erect a new building at once. Its office files were destroyed and it would be pleased to receive reference books from manufacturers. H. S. King is in charge.

The Hoffman Engineering Company, Pennsylvania Building, Pa., has taken out a permit for the erection of a new addition to the foundry of William Cramp & Sons Ship & Engine Building Company to cost about \$2,000.

It is reported that the United States Cast Iron Pipe & Foundry Company is receiving estimates for additions to its plant at Burlington, N. J.

The American Manganese Bronze Company, Holmesburg, Philadelphia, plans to erect a small machine shop to relieve the crowded conditions in its present one, which it plans to use for other purposes. It is not in the market for new tools at the present time. T. H. Addie is in charge.

The Keystone Device Company, Harrisburg, Pa., has established a plant for the manufacture of a patented automobile washing device composed of a brush and nozzle.

The Consumers' Ice Company, Chester, Pa., is about to contract for a new cooling system.

The Estate of E. P. Morris, 119 South Fourth Street, Philadelphia, Pa., has awarded contract to the Lansdowne Construction Company, Lansdowne, Pa., for the erection of a two-story stone machine shop and garage, 46 x 112 ft., to cost about \$11,000.

The Unit Construction Company, Thirty-first and Chestnut streets, Philadelphia, have established a plant for the manufacture of architectural and cabinet woodwork.

The United Novelty Company, Lancaster, Pa., has established a plant for the manufacture of manicure sets, fountain pens and mountings, etc. Albert Rosenstein is

president, E. R. Rosenstein is treasurer and I. Rosenthal is secretary.

P. J. Collins, 1301 North Seventh Street, Philadelphia, is having estimates taken for a one-story machine shop, 18 x 108 ft. William Lowenthal, 1208 Chestnut Street, is the architect.

The Pennsylvania Railroad Company, Broad Street Station, Philadelphia, has taken bids for one-story powerhouse and scalehouse, 30 x 86 ft., from plans by its architect, William H. Cookman.

Edwin Kirk, 1911 Market Street, Philadelphia, has had bids taken for a two-story factory and garage, 43 x 200 ft., to cost about \$25,000.

The Heydt Motor Company, Reading, Pa., has been incorporated with a capital stock of \$20,000 by Irvin W. Heydt, Preston L. Bell and Earl L. Auman to manufacture and repair automobiles.

William J. Scott, Inc., Philadelphia, has been organized with a capital stock of \$10,000 by Isabella T. and John Porter Scott, 5946 Woodbine Avenue, and Percy M. Harshaw, 939 South Fifth Street, Philadelphia, to manufacture scientific instruments.

The Lackawanna Cutlery Company, Nicholson, Pa., has been incorporated with a capital stock of \$10,000 by Morris G. Hinkley, Wilder G. Tiffany, Charles W. Dunlap, Thaddeus S. Hibbard, Harry H. Hibbard and James Mulholland to manufacture cutlery.

The West Philadelphia Garage Company, Philadelphia, has been incorporated with a capital stock of \$5,000 by Victor Powers, Charles E. Wiley, George Graven, to conduct a garage and repair shop.

The Whittington-Vaughn Company, Easton, Pa., has been incorporated with a capital stock of \$10,000, by Joseph H. Whittington, William H. Vaughn and Newton R. Turner to manufacture tools, vices and metal specialties.

The Henry F. Kusel Company, Philadelphia, has been incorporated with a capital stock of \$10,000 by Julius Aderer, 3 West Seventy-fifth Street, New York; Henry F. Kusel, 1240 North Fifty-ninth Street, Philadelphia; Joseph Wolff, 308 West 112th Street, New York, and Louis Weckmann, 503 West 121st Street, New York, to manufacture dental supplies.

The I. T. Reitter Company, Philadelphia, with a capital stock of \$150,000, has been incorporated by Ivan T. Reitter, 6396 Overbrook Avenue; Alexander K. McCullough, 6308 Drexel Road, and James K. Walker, 5313 Baltimore Avenue, to build bridges, power plants, etc.

The Eastern Top & Body Company, Philadelphia, has been incorporated with a capital stock of \$10,000, by William J. Beury, 3432 North Seventeenth Street; A. L. Hastings, 5024 North Fifteenth Street, and Charles E. Beury, 2104 West Tioga Street, to manufacture tops and bodies for vehicles.

Baltimore

BALTIMORE, MD., Aug. 7, 1916.

Plans are being made by the Maryland Metal Cross Tie Company, Munsey Building, Baltimore, for the construction of a plant at Havre de Grace, Md., for the manufacture of metal cross ties.

A mold loft and punch shop to cost \$70,000 will be built by the Pusey & Jones Company, Wilmington, Del. It is said further additions will be made later.

The Wilmington Leather Company, Wilmington, Del., plans the construction of a two-story addition at Second and Greenhill streets.

Plans are understood to be under consideration by the DuPont Powder Company, Wilmington, Del., for the construction of a chemical engineering building.

The Harvey Company, 113 South Street, Baltimore, is seeking prices on steam shovels.

Prices on ice machinery are being sought by C. E. Hammer, Narrows, Va.

With \$10,000 capital stock the Howard W. Poole Electric Shoe Repairing Company has been incorporated at Newport News, Va. W. B. Howard is the secretary.

Two additions are being built for the Electric Hose & Rubber Company, Wilmington, Del. One is two stories, 300 x 400 ft., and the other, one-story, 50 x 150 ft.

The Coale Muffler & Safety Valve Company, 325 East Oliver Street, Baltimore, has acquired a lot on Oliver Street near Gullford Avenue.

A boilerhouse will be built by the Wilmington & Brandywine Cemetery, Wilmington, Del.

Chicago

CHICAGO, ILL., Aug. 7, 1916.

The resumption of buying both by our own manufacturers who have taken shell contracts and by others in the interests of foreign clients has been felt very generally by machinery interests. There has also been a very substantial demand for tools for use in shipbuilding plants, purchases being reported as including standard machine tools with machines for steel fabrication. A very considerable aggregate of inquiry for single tools both new and second-hand is before the trade. Railroad inquiry continues conspicuous by reason of its absence, and with the exception of one or two sales the business in that direction is devoid of interest.

During the week beginning Aug. 7 the Chicago Association of Commerce will have at its offices an exhibit by means of which the complete details and requirements involved in the filling of an export order will be visualized.

The McCauley Belting Company, 412 Orleans Street, Chicago, is about to install a 30-in. power press.

H. P. Nelson, 649 Wellington Avenue, Chicago, is having plans prepared for the erection of a piano factory, 60 x 125 ft. three stories, to cost \$35,000.

A. G. Spalding & Bros., Chicago, have awarded the general contract covering the erection of a warehouse and boilerhouse for which a total expenditure of \$100,000 is contemplated.

The Pyle National Company, Chicago, manufacturer of electric headlights and kindred equipment, will build a plant on Kostner Avenue near Hirsch Street to cost \$250,000.

McClernan & Co., Chicago, have plans completed for a factory building to be erected at North Chicago, Ill., at a cost of \$35,000. The company manufactures metal kitchen cabinets.

The Illinois Smoked Meat Company, Chicago, has purchased property at Western Avenue and Forty-fifth Place and will erect a factory and storage building to cost \$170,000.

The Quaker Metal Company, Chicago, has been organized with a capital of \$1,000 by Arthur H. Lemon, 122 South Winchester Avenue, Ida M. Lemon and W. W. Hoover.

George B. Dryden, Chicago, has purchased a site just north of the Baltimore & Ohio Chicago Terminal Railroad, between West Forty-third and West Forty-fourth streets, upon which he will erect a plant for the manufacture of rubber goods.

The Mackie-Lovejoy Mfg. Company, 1701 West Thirteenth Street, Chicago, manufacturer of metal goods, is adding three stories to its present factory.

The Arnold Company, engineer, 105 South LaSalle Street, Chicago, is preparing plans for new manufacturing buildings for the Pullman Company, the erection of which is estimated to cost \$3,000,000.

The Globe Machinery & Supply Company, manufacturer of boilers, pumps, factory supplies, etc., Des Moines, Iowa, advises that the site on which it proposed to erect a six-story factory to cost about \$100,000 has been condemned for public service and that this will hold up its building operations for some time to come. F. W. Swanson is general manager.

The American Strawboard Company will make improvements in its plant at Quincy, Ill., involving an expenditure of \$350,000.

The Illinois Corrugated Metal Company, recently removed to Springfield, Ill., advises that it expects to be in the market for some additional equipment in the fall.

The Barry Automatic Marker Company, Ottumwa, Iowa, has removed to Davenport, where it will operate a plant to manufacture markers for farm machinery.

Indianapolis

INDIANAPOLIS, IND., Aug. 7, 1916.

The McCray Refrigerator Company, Kendallville, Ind., will build two additions to its plant, one to be used as a wood shop and the other an addition to its tin shop and nickel-plating works. New machinery will be installed.

The Union City Body Works, Union City, Ind., has awarded the contract for the erection of a new factory building which will allow it to double the capacity of its plant.

The Star Generator Company, Logansport, Ind., has been incorporated with a capital of \$50,000 by Edgar F. Metzger, Harry C. Metzger and Orpha Carter.

The Indiana Tank & Boiler Works, Indianapolis, Ind., has been incorporated with a capital of \$10,000 to manufacture steel plate and sheet-iron products. The incorporators are E. A. Craig, J. E., R. R. and H. E. Bossingham.

Cincinnati

CINCINNATI, OHIO, Aug. 7, 1916.

After preparing statements for the month of July, machine-tool builders as a rule were somewhat surprised at the total production for that month. It seems that the intensely hot weather prevailing in the last two weeks of July did not affect production as much as was estimated. Quite a number of orders have been received lately from England, but Canadian business seems to be slowing up. The English orders call mostly for lathes, but other types of machine tools are included. Domestic manufacturers of munitions continue to buy lathes and other tools, the orders from this source now being limited to a small number of special tools, some of which are for replacement purposes. This only applies to munition makers in the Central West.

Dealers in mill supplies report business on the mend, and expect that it will be as good as the first week in July within the next few days. The hot weather for two weeks curtailed the business to some extent.

The Enger Motor Car Company, Cincinnati, will soon be incorporated with \$4,000,000 capital stock to take over the automobile manufacturing business of a firm operating under the same name. The company will greatly enlarge its plant on Gest Street, and expects to double its output of cars. No change will be made in the present officers, and Frank J. Enger will continue as president.

The Union Thread Company, Cincinnati, will double the capacity of its plant in Carthage, a suburb, at an early date.

The Phoenix Caster Company, Hamilton, Ohio, is moving its plant to the building formerly occupied by the Republic Motor Car Company. It expects to increase its manufacturing facilities.

The Cincinnati Sanitarium, College Hill, Cincinnati, will construct an addition to its power plant, for which equipment will be required. Walter G. Franz, Union Trust Building, Cincinnati, is the engineer in charge of the work.

The R. B. Hume Automobile Company, Covington, Ky., has opened a garage on East Fifth Street, in connection with which a repair shop will be operated.

The Belmont Casket Mfg. Company, Columbus, Ohio, is fitting up a plant for the manufacture of lead-coated steel caskets. The company has part of the former plant of the Peters Carriage Company. An addition to the building will be made at an early date.

The McKinnon Dash Company, Troy, Ohio, has purchased the plant of the Peters & Herron Dash Company, Columbus, Ohio, and will remove it to Troy at an early date. Only a small amount of extra woodworking equipment will be required.

The Charles Boldt Glass Company, Cincinnati, reports that work on its new plant at Huntington, W. Va., is progressing at a satisfactory rate and that the necessary equipment will be installed before the end of the present year.

The Lucas-Miller Pump Company, Springfield, Ohio, has been incorporated with \$25,000 to manufacture small electric pumps. Clyde C. Miner is one of the principal incorporators.

Detroit

DETROIT, MICH., Aug. 7, 1916.

The heaviest machine-tool demand at present is for milling and grinding machines, with a fair demand for single machines of all kinds. Difficulty is experienced in getting machines, from four to six months being required for delivery. Scarcity of labor, due partly to lack of housing facilities, is working a hardship on the shops, which have capacity orders for a considerable time ahead. Metal-working companies are working to the limit, foundries and brass-working shops being especially overwhelmed with orders. The foreign demand continues strong. Wholesale and retail conditions are excellent.

Incorporating under the laws of New York, the Scripps-Booth Corporation consolidates the Scripps-Booth Company and the Sterling Motor Company, Detroit, manufacturers of motor cars. The new corporation's capitalization comprises 70,000 shares of no par value. W. E. Scripps is president.

Two pieces of construction work for the Detroit Studebaker factories will begin shortly. An extra floor, 50 x 300 ft., will be added to one of the three-story buildings, while a new building of 25,000 sq. ft. floor space will be added for final assembly work. J. M. Studebaker, South Bend, Ind., is chairman of the board of the Studebaker Corporation of America.

Detroit and New York financial interests have purchased and assumed control of the Detroit Weatherproof Body Company, manufacturer of limousine tops, Detroit. The company has secured factory space of 50,000 sq. ft. at 1884 Mount Elliott Avenue. It is understood that it intends to erect a factory to provide for an annual output of from 50,000 to 100,000 tops.

The plant of the Great Lakes Engineering Works at St. Clair, Mich., has been taken over by the Pope Brothers & Cheppu Company, Ltd., for a consideration of \$200,000. It is reported that the property has been secured for the Canadian Government, which is also making plans, according to reports, to take over the shipbuilding yards of the C. C. Smith Boat & Engine Works, at Algonac, and the S. C. McLowd shipbuilding plant at Marine City.

Work on the improvement of the Pere Marquette Railroad yards at Flint, Mich., has been started. It is expected that \$200,000 will be spent there before fall. The yards are being extended, a new coaling dock is being erected and an engine terminal is to be installed near the Buick automobile factories.

The Monroe Body Company, Pontiac, is to build a new office structure and a plant for pressed steel work. The capital of the company has been increased to \$150,000.

Another addition, containing 5000 sq. ft. of floor space, is being added to the Holland Furnace Company, Holland, Mich.

Petoskey, Mich., is enjoying the greatest building boom in its history. The Blackmer Rotary Pump Company has just completed a large addition; the Petoskey Block & Mfg. Company has begun a new addition to its factory, and other companies are contemplating building additions.

Excavation has been begun at Grand Haven, Mich., for the new factory of the Alter Motor Car Company.

The Aspinwall Mfg. Company, Jackson, which specializes in the manufacture of farm machines and tools, has increased its capital from \$130,000 to \$300,000.

Martin Roskey, William A. Falk and John J. Karcher have incorporated the Premier Machine Company, Detroit, Mich.

The Detroit Steering Gear Company, Detroit, has been incorporated by Henry B. Lewis, Frank Carrico and H. S. Hall with a capitalization of \$5,000.

The Bour-Davis Motor Car Company, Detroit, has completed a concrete and steel factory, 150 x 200 ft., four stories.

The Field Motor Company, Grand Rapids, has practically completed negotiations for the erection of a factory building for the manufacture of a new process gasoline and kerosene engine. It will be one story, 50 x 100 ft.

The Adrian Steel Castings Company's plant at Adrian, Mich., which was practically destroyed by fire last week, will be rebuilt at once. The fire loss was \$40,000.

Cleveland

CLEVELAND, OHIO, Aug. 7, 1916.

While no round-lot sales or inquiries are reported, the market is fairly active, particularly for the vacation season. Sales during the week were made up of orders for single or two or three machines. The aggregate volume of business was very satisfactory. Second-hand machinery is moving quite well. The supply is adequate but much of it is being held for higher prices. Considerable business is in prospect for equipment for new plants. With the scarcity and high cost of labor the managers of old plants are turning their attention more than ever to the installation of labor-saving equipment. The demand for cranes continues very active.

The Barberton, Ohio, plant of the Babcock & Wilcox Company, has taken another shell order which is reported to amount to \$4,000,000. This order is for 9.2-in. shells. The Barberton plant is working on a former order for shells of the same size which will be completed in about two months. It is stated that two more factory buildings will be added to the plant and some additional equipment will be required.

The Steel Improvement & Forge Company, Cleveland, has been organized to take over the plant and business of the Steel Improvement Company and the forging business of the Forest City Electric Company which occupies an adjoining plant. The new company has been incorporated with a capital stock of \$150,000. The officers are W. E. Byrnes, president; George N. Chandler, vice-president and treasurer; W. C. Whyte, secretary. The officers with F. W. Starring, S. H. Moore and N. B. Johnson comprise the board of directors. An addition will be built to the heat-treating plant and the capacity of the forge shop will be increased by the installation of additional hammers.

The Morgan Engineering Company, Alliance, Ohio, has commenced the erection of a new forge shop, 70 x 150 ft. Several hydraulic presses and other equipment will be installed.

The machine shop of the Carroll Foundry & Machine Company, Bucyrus, Ohio, was burned Aug. 3, causing a heavy loss in equipment.

The American Auto Trimming Company, Cleveland, has

been incorporated with a capital stock of \$100,000 and will establish a plant in the factory building of the Properties Company on East Seventy-ninth Street for the manufacture of automobile accessories. Among those interested are Benjamin Gottfredson and Frank Joyce, both at present engaged in a similar business in Detroit.

The Cleveland Cadillac Company, Cleveland, will shortly begin the erection of a brick building to be used as a service station.

The Powers Mfg. Company, Lima, Ohio, has signed an agreement with the Marion Chamber of Commerce to move its plant to Marion, Ohio, and plans the erection of a new plant, 80 x 500 ft. This company was formerly the Primm Gas Engine Works. Its foundry in Lima was recently burned.

The stockholders of the Rath Aluminum & Brass Foundry Company, New Philadelphia, Ohio, have purchased a foundry building from the New Philadelphia Improvement Company and plan to enlarge it and establish a plant for the manufacture of electric vacuum cleaners.

William Plotz, who operates the William Plotz Iron Works, 401 Champlain Avenue, Cleveland, will build a two-story factory, 50 x 180 ft.

The Motor Products Company, Cleveland, has been incorporated with a capital stock of \$35,000 by Clifford S. Goby of the Motor Engineering Company, and others.

The Blomquist-Eck Machine Company, Cleveland, has been incorporated with a capital stock of \$100,000 by A. E. R. Blomquist and others.

The Acme Metal Stamping Company, Cleveland, has been incorporated with a capital stock of \$10,000 by W. A. Neff, H. A. Yoder, and others.

The Caranaham Tin Plate & Sheet Company, Canton, Ohio, is in the market for a 100-in. plate shear to cut $\frac{3}{4}$ in. to 5/16 in.

The Ohio Locomotive Train Company, Bucyrus, Ohio, is seeking a three-motor electric overhead traveling crane of 10, 15 or 20-ton capacity and 40-ft. span, to operate on a three-phase, 60-cycle, 220-volt, alternating current.

Milwaukee

MILWAUKEE, WIS., Aug. 7, 1916.

In spite of the vigorous protests voiced by the farm implement and gas engine trade against advanced prices made effective some time ago, Milwaukee and Wisconsin manufacturers of these products report that the fall buying movement has begun. This is the earliest date known in many years for the commencement of buying and is taken in some quarters to indicate that purchasers mean to protect themselves against further possible advances. Gas-engine makers devoting their facilities to machines for farm purposes have been obliged to cut short the usual mid-summer slack period so that work on new bookings may get under way with the least delay.

Conditions in general in Milwaukee are well indicated by the fact that new construction during the first seven months of the year shows a gain of approximately 57 per cent over the same period of 1915. The value of permits issued to Aug. 1 is \$8,334,086, against \$5,300,540 a year ago. July permits were 150 per cent in excess of July, 1915.

Inquiry for milling machines since Aug. 1 shows a decided revival, and bookings are gaining. The demand for machine tools generally is very satisfactory, and because of improvement in business and the interference of hot weather, some makers are again falling behind on deliveries. The situation, however, is not nearly so serious as it was three or four months ago. The machinists' strike admittedly has affected the output, but not to so great a degree as feared earlier.

The Packard Motor Car Company, Chicago, Ill., will award contracts this week for a machine shop addition to its Milwaukee branch at Thirty-fifth Street and Grand Avenue, of brick and steel, 60 x 70 ft. Brust & Philipp, Milwaukee, are the architects.

The Chippewa Foundry & Machine Company Chippewa Falls, Wis., has completed plans for a new plant, 60 x 221 ft. It has increased its capital stock from \$25,000 to \$100,000.

The Falls Machine Company, maker of wood-working machinery, motors, engines, engine stops and gray-iron castings, Sheboygan Falls, Wis., which has been acquired by the Falls Motors Corporation, effected an increase in its capital to provide for immediate expansion. The present output of 50 motors will be increased before Oct. 1 to 80, and by Jan. 1 to 100 motors per day, in order to take care of contracts which either have been or are about to be closed. The company has for the past two years specialized in the manufacture of the overhead valve type of motor, although two or three models are still produced of the "L" head construction. A new test department 250 ft. long, which has a ca-

capacity of 120 motors daily, has just been completed. Contracts will be let within a few days for an addition to the assembly department, 120 x 180 ft. At present somewhat over 450 men are employed and this number is being increased daily. The officers of the new corporation remain as before: G. Huette, president; R. W. Randall, vice-president; A. R. Clas, secretary; K. F. Schreier, treasurer; with the addition of Leroy Miser as a vice-president and J. G. Lude, formerly purchasing agent, as assistant secretary.

East Troy, Wis., is in the market for one air compressor, one belt-driven suction pump and one 25-hp. motor with shaft, pulleys, etc., for the municipal waterworks system. Bids will be taken until Aug. 14 by O. R. Kurzrock, village clerk.

The North End Foundry Company, West Allis, Milwaukee, is rushing work on its foundry addition and expects to take possession before Sept. 1.

The Gehl Brothers Mfg. Company, West Bend, Wis., maker of gasoline engines and farm implements, has completed the first model of a kerosene-driven tractor which it plans to build in quantity. The design is by William Baumheckl, Detroit, Mich., now associated with the Gehl Company.

The Sheriffs Mfg. Company, 124 Barclay Street, Milwaukee, manufacturer of propeller wheels, resumed operations Aug. 7 after a temporary recess due to a fire which damaged the plant Aug. 2.

The Eureka Grave Maker Company, Stevens Point, Wis., maker of cast-iron and aluminum cemetery goods, is preparing to erect a plant to cost \$15,000. It will be of brick and steel, 57 x 75 ft., two stories and basement. The goods have been manufactured up to this time by outside foundries on contract.

The Wisconsin Telephone Company, 183 Fifth Street, Milwaukee, is having plans prepared by A. C. Eschweiler, architect, Goldsmith Building, for a private garage and machine shop on Clybourn Street, between Thirteenth and Fifteenth streets. It will be 100 x 432 ft., two stories and basement, of brick and steel. A complete machine shop equipment and numerous electric elevators will be required. W. D. Hobbins is chief engineer.

Ground has been broken by the Wald Machine Company, Sheboygan, Wis., for its new machine shop, 80 x 100 ft.

The Heil Company, Milwaukee, structural fabricator and tank and boiler manufacturer, is making excellent progress in the erection of its new shop and factory at Twenty-sixth and Montana avenues and will be ready to begin operations in the new plant by about Oct. 7. Julius P. Heil is general manager.

The Warner works at Beloit, Wis., of the Stewart-Warner Speedometer Corporation, Chicago, will be changed into a malleable iron foundry and general castings shop to supply the other factories operated by the company. The Beloit plant has been manufacturing complete instruments up to this time, but it is planned to concentrate the finishing processes at the main plant in Chicago and the making up of raw material at Beloit.

Schauer Brothers, Westfield, Wis., have purchased a site for their proposed new machine and smithing shop, which is to cost about \$6,000.

The R. L. Kenyon Company, Waukesha, Wis., maker of camp furniture, etc., is increasing its capacity to turn out an order for 30,000 cots for the United States Government. The company has abandoned its plan to establish a department for the production of fiber furniture.

E. S. Mason, Brule, Wis., purchased the machine shop of J. L. Thrall at Washburn, Wis., and took possession Aug. 1.

The A. O. Smith Company, Milwaukee, manufacturer of automobile parts and trucks, has contracted with the Milwaukee Electric Railway & Light Company for 500 to 800 kw. of current, its own big power plant having been outgrown. An addition will probably be made and several new generating units required. L. Ray Smith is president.

The Beeman Gas Tractor Company, Minneapolis, Minn., is negotiating with the Chamber of Commerce, Oshkosh, Wis., with a view to relocating its works. The concern specializes in a small general utility gas machine weighing only 500 lb.

The Gilson Mfg. Company, Port Washington, Wis., gray-iron foundry, gasoline engines, etc., is working all departments to capacity and may be compelled to make extensions next winter. Its gasoline engine business has opened much earlier than in former years and prospects are for the heaviest demand ever known. An order was booked last week for three carloads of engines for a Texas jobber.

The Lyman-Joseph Grain Company, Milwaukee, is preparing to increase the efficiency of its big grain elevator by installing new machinery and overhauling the present equipment.

Floyd Ghastin, Sextonville, Wis., will erect a garage and commercial machine shop.

L. A. Jiranek, Merrill, Wis., is organizing a company with

the assistance of the Merrill Business Men's Association to engage in the manufacture of sanitary baby dressers and other sheet-metal furniture specialties. Factory quarters will be leased.

The New England Supply Company, Providence, R. I., may establish a plant in Green Bay, Wis., to utilize by-products and waste of the Green Bay Stockyards & Packing Company's plant.

The Wisconsin Seating Company, New London, Wis., which is enlarging both wood and metal-working departments to handle extensive cabinet orders from the Edison Phonograph Company, has been offered a large contract by the New York Study Chair Company to manufacture a new type of school desk. If the order is closed, 30,000 desks will be turned out at once, and extension plans will be revised for greater capacity.

The Central South

LOUISVILLE, KY., Aug. 7, 1916.

Business continues generally good, machine-tool and power requirements being well to the front. Small lathes, drill punches and other equipment for small garages are in good demand. Oil-well drilling machinery and shop equipment are moving actively. A good part of the current inquiries relates to replacements and equipment for extensions of existing plants.

Fire destroyed the plants and equipment of the F. C. Miller Planing Mills, Monmouth Street, Newport, Ky., July 30, with a loss of \$35,000 and the George L. Lape Furnace Company, with a loss of \$12,000.

The Owensboro Ditcher & Grader Company, Owensboro, Ky., has leased a factory building and will shortly occupy it, adding to the present equipment and removing from its existing plant.

Harrison L. Scott, Lexington, Ky., has purchased the Central Garage and will make improvements.

Preliminary work is being done for erection of the re-drying plant of the Liggett & Myers Tobacco Company, Lexington, Ky. The contract, which includes a power plant, boiler house, etc., has been let to the Combs Lumber Company, Lexington.

The Cumberland Natural Gas Company, Barbourville, Ky., is in the market for a guy derrick of 10-ton capacity with 40-ft. boom, new or second-hand.

Two mills of the Lucas Land & Lumber Company were destroyed by fire at Paducah, Ky., on Aug. 4, with a loss of \$15,000.

The Dixie Foundry Company, Cleveland, Tenn., has been incorporated with \$10,000 capitalization by J. C. McKenzie, S. B. Rymer, F. J. Earle and others.

E. B. Ogden, R. G. Pursley, Sam A. Conner and others of Chattanooga, Tenn., are organizing the Union Stock Yards & Packing Company, to be capitalized at \$150,000, and to establish and operate a stockyards and meat-packing plant to have a daily capacity of 300 hogs, 50 head of cattle and 50 head of sheep.

J. W. Briscoe of Greenville, Ind., proposes to establish a plant at Bowling Green, Ky., to manufacture boxes and crates.

The Cortrim Lumber Company, organized by George M. Speigle and others with \$75,000 capital, has purchased the Peter-McCain Lumber Company, Bristol, Tenn., and will enlarge and install additional machinery.

Birmingham

BIRMINGHAM, ALA., Aug. 7, 1916.

Outside of regular buying of cotton ginning machinery, a specialty in the trade, wholesale machinery dealers report a continuation of the lull in buying which set in four weeks ago. The lumber trade is the duller of all and even electric apparatus is moving slowly. Alabama suffered tremendous losses in cotton and corn on account of the floods. How much of this will be made up by late forage and food crops remains to be seen.

The D. B. Sharp Mfg. Company, Jacksonville, Fla., has been incorporated with a capital stock of \$2,000 by D. B. Sharp, F. J. Brock, R. B. Tupper, and others, to manufacture gasoline and oil engines, air compressors, steam pumps, etc. The same interests recently formed the D. B. Sharp Machinery Company.

The Pensacola Maritime Company, Pensacola, Fla., capital stock \$25,000, has been incorporated by William H. Knowles, Henry M. Yonge and Ellis Knowles to operate shipyards.

The Western Carolina Power Company, Bridgewater, N. C., subsidiary of the Southern Power Company, Charlotte,

N. C., will develop extensive waterpower around Bridge-water at a cost of \$3,000,000.

The Carolina Light & Power Company, Raleigh, N. C., is reported as contemplating the expenditure of several millions of dollars in building a hydroelectric plant on the Yadkin River near Badin, N. C.

The machine shop of the Duane Chair Company, Dalton, Ga., was destroyed by fire July 18 with a loss estimated at \$145,000. The plant employed about 150 workmen. J. J. Duane is president.

The Giant Furniture Company, High Point, N. C., will erect a finishing room and warehouse, 100 x 125 ft., and an additional machine room, 80 x 120 ft., both two stories, of frame construction. It will install electric motors and other equipment at a total estimated cost of \$20,000.

The Mill-Power Supply Company, Charlotte, N. C., is in the market for a second-hand 6-ft. rotary cement kiln.

The Bates-Hudnall-Jetton Company, Tampa, Fla., will build a planing mill. The company has been organized with a capital stock of \$50,000.

St. Louis

ST. LOUIS, MO., Aug. 7, 1916.

General business conditions are regarded as justifying optimism, in the opinion of the machine-tool dealers, who report that business in machinery lines is steadily maintained. It is general in its character and widespread as to source. While some apprehension is felt because of the extreme heat and its effect on the crops, reports indicate that business will be maintained at a satisfactory level because high grain prices will cover reductions in production.

A building is to be erected for the Emerson Electric Company, producer of electric fans, etc., St. Louis, Mo., 150 ft. square, seven stories, for the extension of its manufacturing capacity.

The St. Louis Felling Machine Company, St. Louis, Mo., has let contract for the construction of one and two-story factory, at 3763 Forest Park Boulevard, to cost about \$12,800. It will be 60 x 177 ft., and is to be completed in 90 days. Charles L. Knower is president.

The Hirsch Rolling Mill Company, St. Louis, Mo., is making additions to its plant which will enable it to produce new specialties including light rails and fastenings for iron and steel.

The United States Engineers' Office, St. Louis, Mo., is in the market for one pair of tandem compound condensing engines for a stern wheel steamboat. Bids will be received until Aug. 16.

R. K. Papin, 325 Locust Street, St. Louis, Mo., is in the market for a locomotive of about 50 tons, of short wheel base, with low drivers.

Ulrich, Mo., is having plans prepared for the rebuilding of its electric light plant, recently destroyed by fire.

The American Zinc, Lead & Smelting Company, Granby, Mo., will equip a concentrating plant and also install other machinery for 300 tons capacity each shift.

The General Explosives Company, St. Louis, Mo., recently incorporated, with offices in the Railway Exchange Building, will equip a dynamite plant at Joplin, Mo. Albert J. Rawlings, with present headquarters at Connor Hotel, Joplin, is in charge.

The Yellville Machine Shops & Foundry Company, Yellville, Ark., is reported in the market for a gasoline engine, lathes, drill presses, band saws, boiler and engine repair machinery. Ross, J. E. and E. R. Lee are stockholders.

The Helena Gas & Electric Company, Helena, Ark., will expend about \$6,000 on additional equipment. W. J. O'Brien is the engineer.

The McNeely Motors Company, Arkansas City, Mo., has been incorporated with a capital stock of \$10,000 by T. B. McNeely, W. J. Massey and F. M. Rogers to conduct a garage.

The Patty Gin Company, Bristow, Okla., will equip a cotton-seed oil-mill and a cotton gin. The company is capitalized at \$50,000.

Waynoka, Okla., will purchase an engine and other equipment for its waterworks plant and electric light station.

Cosden & Co. and the Cosden Oil & Gas Company, Tulsa, Okla., will expend about \$5,000,000 on improvements to their oil-refining and other plants.

The Westerman Motor Car Company, Tulsa, Okla., has been incorporated with a capital stock of \$17,000 by Joseph E. Washington and others.

The Reneau Motor Car Company, Oklahoma City, Okla., has been incorporated with a capital stock of \$15,000 by H. W. Reneau and others to operate a garage.

The Sewerage and Water Board, New Orleans, La., F. S. Shields, secretary, will receive bids until Sept. 13 for two 15-ton traveling cranes.

John T. Gibbons, New Orleans, La., will equip a feed and grain mill, including a grain elevator of 250,000 bu. capacity, grain handling machinery, electric motors, etc., about \$225,000 being involved. E. R. Bartholomew is superintendent.

Charles F. Rantz, New Orleans, La., will equip an ice factory of 75 tons daily capacity at Myrtle, La.

The St. Louis, Iron Mountain & Southern Railway, E. A. Hadley, St. Louis offices of the company, chief engineer, will equip a 15-stall roundhouse, machine and boiler shops, repair shop, turntable, mechanical coal chute, water plant, etc., at Monroe, La., to cost about \$142,000.

Shreveport, La., will equip a sanitary sewer system requiring two sewage pumping plants and other mechanical equipment. John B. Hawley is engineer.

The St. Louis & San Francisco Railroad, V. K. Hendricks, St. Louis, Mo., chief engineer, will expend about \$450,000 on a 35-stall roundhouse, machine shops, trackage, etc., at Sapulpa, Okla.

The Automatic Carbon & Holder Company, El Reno, Okla., has been incorporated, with a capital stock of \$50,000, by Amantes Hunsicker, A. L. Harris, and others, and will equip a manufacturing plant.

The Pailey & Treigle Sash Factory, New Orleans, La., will erect an addition and install new machinery.

Texas

AUSTIN, TEX., Aug. 5, 1916.

The increase of mining development operations in New Mexico and Arizona has caused orders to be placed for much ore mill machinery. The tool and machinery trade shows an improvement over a week ago.

The Farmers' Gin Company will build a cotton-gin at Nordheim to cost about \$9,200. T. F. Mangum is in charge.

The Miami Consolidated Copper Company, Miami, Ariz., is building an electric power plant at a cost of about \$300,000. Three Diesel engines will develop 3750 hp., direct-connected to dynamos which are to deliver 2160 kw.

The United Verde Extension Company will soon select a site at Jerome, Ariz., upon which it will construct a new smelter. The company will also install additional hoisting equipment.

The Ray Hercules Mining Company is having plans drawn for a 1000-ton concentrating plant that it will build at Kelvin, Ariz., at a cost of about \$300,000.

The Alamogordo Marble Quarries Company, incorporated with a capital stock of \$250,000, will operate marble quarries and polishing works near Alamogordo, N. M.

The Department of Public Works of the de facto Government of Mexico in the City of Mexico has placed eight corps of engineers in the field to run surveys for lines of railroads which it has planned to build as soon as the routes are finally located. One of the proposed roads is to run from Campeche to a connection with the National Tehuantepec Railroad, a distance of 450 miles; another is to run from Durango to Concepcion del Rio, in the State of Zacatecas, a distance of about 350 miles; another from Ameca, in the State of Jalisco, to the port of Chamela, on the Pacific coast, a distance of about 125 miles, and another from Saltillo, in the State of Coahuilla, to Orteaga, a distance of about 175 miles.

San Francisco

SAN FRANCISCO, Aug. 1, 1916.

Many machine-tool buyers still regard the future as too uncertain to warrant purchases for six months or later delivery; but orders for future shipment are fully as numerous as for the past two months. While merchants are receiving many tools on old orders, they are unable to accumulate any stock worth mentioning. A number of fairly large orders have been placed recently for the extension of manufacturing plants, and a few new inquiries of this nature are still appearing. The smaller trade is continually in the market for single tools of standard design. Special automatic and labor-saving machinery is finding considerable favor for the newer plants. Aside from shipbuilding, development is especially active in internal combustion engines, including gasoline tractors and pumps. Electric motors for irrigation units also are in active demand in some sections. Oil tools are doing fairly well, though hardly up to expectations.

Six manufacturers are actively engaged in the production of potash from kelp on the southern California coast, having an investment of over \$3,000,000 in the aggregate in barges and special harvesting and reduction machinery. The power for propulsion and driving the harvesting machinery consists mainly of gas engines of local make.

The J. D. Barnes Company, 175 Steuart Street, is preparing to build a plant for the construction of wooden ships adjoining the Alaska Packers' Association quarters in Alameda. Contracts have already been received for two vessels, to be equipped with pairs of twin 385-hp. Skandia Diesel engines.

The Honolulu Iron Works, Honolulu, T. H., has received a large machinery order from the Calamba Sugar Estate in the Philippine Islands, which will double its sugar mill capacity.

The plant and all equipment of the California Magnesite Company, Porterville, Cal., was purchased last week at auction by the Joshua Hendy Iron Works, San Francisco, the largest creditor. It is understood that the plant will be completed according to the original plans, to handle crude magnesite on a custom basis.

The Horstman Chemical Company is planning to build an addition to its plant at Redwood City, Cal.

It is announced that the Globe Milling Company will establish several cotton gins at Mexicali, in Lower California.

The American Ever-Ready Company has purchased a large site at Eighth and Brannan streets, San Francisco.

Work has been started for several new factory buildings at Redwood City, Cal., or the Cristofferson Aircraft Mfg. Company, now in Oakland.

Bids will be received Aug. 9 for hydraulic machinery and electric generators for the Lower Cherry River development of the Hetch Hetchy water project.

San Diego, Cal., is making preliminary estimates on an emergency pumping plant to be built in the Tia Juana River.

The Samson Sieve-Grip Tractor Company has been incorporated at Stockton, Cal., with a capital stock of \$400,000, by F. A. Cramblitt, P. T. Cleghorn, V. Cassilis, W. H. Lyons and Fred Lambert. The plan is to take over all the present property of the Samson Iron Works, and increase the facilities for manufacturing traction engines, the demand for which has grown beyond the present capacity. The company, which now employs 200 hands, will increase its force to 300. A Rennerfelt electric steel furnace will be installed, together with a new brass foundry, and the plant will be reorganized.

Work has just been started on the enlargement of the Standard Gas Engine Company's plant in Oakland. Richard Froboese, formerly chief engineer of the Corliss Gas Engine Company, is the company's engineer.

The Ingersoll-Rand Company of California, mining machinery, formerly located in the Harron, Rickard & McCone Building on Townsend Street, has moved its offices to 710 Rialto Building.

The Pacific Northwest

SEATTLE, Aug. 1, 1916.

The car shortage, particularly on the Southern Pacific lines in Oregon, has become alarming, and appeals are being made by manufacturers to the Public Service Commission for relief. It is now so great that unless relief is obtained promptly some plants will have to be shut down. The Pacific coast exporters are facing an unprecedented situation, with the grain season at hand, only about 10 per cent of the usual number of ships engaged for the exportation of the product are now available. It is evident that the greater part of this business will now be handled by combined rail and water shipments.

Reports from the iron and steel working plants throughout the Pacific Northwest indicate an unusually busy spring and summer. Harvesting machinery has been in very brisk demand. The heavy fruit crops have called for steady shipments of canning and similar equipment, and the shipbuilding boom is unabated. The numerous shipbuilding plants recently constructed all report plenty of work ahead to insure continuous operation.

The Northwest Chair Company, Tacoma, has been organized with capital stock of \$50,000 by George Henry and Joseph H. Gilpin.

The Colfax Iron Works, Colfax, Wash., reports that its plant is crowded with work. The company is now building 12 Carley roller mills to fill orders already placed. The patterns of the plant were destroyed by fire two weeks ago; but are rapidly being replaced.

The American Fire Escape Company has purchased a site in Hillyard, Wash., where it proposes to establish a factory.

Work has started on the initial unit of the Pacific American Fisheries Company's proposed shops at Bellingham, Wash., which is to be a blacksmith shop.

The Admiral Mining Company, Spokane, Wash., will construct a power plant on Deer Creek. Plant will include dam, pipe line, powerhouse, waterwheel, shafting, compressor, air

receiver, electric generator, etc. E. Tappan Tannatt is the engineer.

The Buehner Lumber Company, North Bend, Ore., according to report, will install electric power in its plant. A deal is under negotiation with the Oregon Power Company.

The plant of the Hanover Gypsum Company, Hanover, Mont., has been purchased by the Three Forks Cement Company, Trident, and it is reported the new owners plan the construction of a 2500-bbl. cement plant at a cost of \$1,000,000. The stockholders of the Three Forks Cement Company are also stockholders of the Oregon Portland Cement Company, Portland, which recently opened a large cement plant at Oswego, Ore., near Portland. Clark M. Moore is sales manager of both corporations.

According to statements of D. E. Skinner, president of the Skinner & Eddy Corporation, shipbuilder, Seattle, that company has sufficient work in hand to utilize its new plant to full capacity for more than two years. It has contracts for 10 steam ocean-going carriers, to cost between \$750,000 and \$1,000,000 each. Two vessels have been started, and the keel of the third will be laid within two weeks. The new plant, recently completed, is equipped with the latest type of machine tools and shipbuilding equipment. Improvements and extensions will be made to the plant from time to time.

Canada

TORONTO, Aug. 7, 1916.

A halt in the manufacture of shells in Canada for the Allies has temporarily been called, as a result of specifications being changed for the steel required which has just been made by the authorities. The change is the requirement of steel of a higher tensile strength than has hitherto been specified. It will, of course, be quite possible to manufacture this steel in Canada as hitherto, but as large orders for steel of the quality formerly suitable have been given, and a large stock is on hand, some inconvenience will be caused if these goods have to be made over again. Large orders for shells of 9.2 in. and other high calibers have recently been placed in the United States, and it is reported that others will be distributed in Canada. The first samples of time fuses produced at the loading plant established in Montreal by the Imperial Munitions Board have successfully passed the tests. No shipments have so far been made, however, it is understood, and it is not altogether likely that the expectations as to early delivery will be realized. Hand grenades, the weapons which are proving so regular and effective in the present war, are now being manufactured in Canada, but are being loaded in England.

The Grand Trunk Railway Company, Montreal, propose to build railway shops at Port Huron to cost \$750,000 and has approved a bond issue for this purpose.

The Nova Scotia Steel & Coal Company, New Glasgow, N. S., is contemplating making extensive additions to its iron mines at Wabana, Newfoundland, including new hoisting equipment, boilers, pumps, compressed air plant, power lines, cables, ventilating plant, industrial railroad track, hauling cables, etc. R. E. Chambers is manager of the ore mines and quarries.

M. J. O'Brien, Renfrew, Ont., will build a power plant at Calabogie, Ont., and develop 5000 hp.

The Town Council, Renfrew, Ont., will install a hydro-electric plant at the first chute of the Bonnechere River to develop 1500 hp.

The Canada Spool & Bobbin Company of Walkerton, Ont., is having plans prepared for an addition to its plant which will increase its capacity over 50 per cent.

The Winnipeg Paint & Glass Company's plant at Winnipeg, Man., was destroyed by fire on Aug. 2. The wood-working mill, boilerhouse and several dry kilns were a total loss, upwards of \$100,000. The company has decided to rebuild.

Negotiations between the Brantford Carriage Company, Brantford, Ont., and the Baynes Carriage Company, Hamilton, Ont., have been completed and the Brantford Company has taken over the plant and stock of the Baynes company. Recent building additions made by the Brantford Carriage Company will now be equipped with machinery and utilized, and an additional 60 hands will be taken on. This company has work in sight to keep the enlarged factory running for over a year.

The M. Brennen & Son Mfg. Company, Hamilton, Ont., is in the market for a 10 to 50-hp. motor.

The McKinnon Dash & Hardware Company, St. Catharines, Ont., will have a boilerhouse built at a cost of \$6,000.

The Chatham Electric Company's Plant on Wellington Street, Cheatham, N. B., was destroyed by fire. The loss, including machinery, will amount to \$30,000.

P. T. Dodge, representing the International Paper Company, announced recently that his company would establish a plant in Canada because of the present tariff conditions.

The Eau Claire Water Works Company, Tecumseh, Ont., will shortly call for tenders for the erection of a plant for the waterworks system to cost \$20,000.

Assinibola, Sask., has extended the time for receiving tenders for combustion engines, generator, etc., until Aug. 15.

The Alberta Lumber Company, Vancouver, B. C., has been granted a permit for the erection of a lumber mill to cost \$100,000.

Lyall, Man., will construct an electric light and power plant at a cost of \$8,000.

Bids will be received by the City Council, New Toronto, Ont., until Aug. 14 for the construction of sewers, and a sewage pumping station. T. Lowes, Mimico, Ont., is the engineer.

The West Kootenay Power & Light Company, Nelson, B. C., will construct an 8000-hp. unit at its plant at Upper Bonnington Falls, B. C.

The towns of Richibucto and Recton, N. S., will erect a hydroelectric power plant.

Price Brothers & Co., Ltd., Shipshaw, Que., will install an additional twin-runner turbine of 5000-hp. capacity, together with penstock and other auxiliaries, including a new generator and accessories in its plant. Plans are being prepared by B. S. Kelsch, Power Building, Montreal.

The plant of the Doon Fibre Company, Doon, Ont., recently destroyed by fire with a loss of \$45,000, will be rebuilt and new equipment installed. James Huber is owner.

The Dominion Steel Products Company, Ltd., Brantford, Ont., has been incorporated with a capital stock of \$500,000 by Willoughby S. Brewster, George D. Heyd, Roy T. McGraw and others to manufacture machinery, tools, shells, guns, etc.

The Quebec Shipbuilding & Repair Company, Ltd., Montreal, has been incorporated with a capital stock of \$40,000 by Walter R. L. Shanks, Francis G. Bush, George R. Drennan and others to build ships, torpedo boats, etc.

John Bertram & Sons Company, Ltd., Dundas, Ont., is receiving bids for a pattern shop of reinforced concrete construction.

Government Purchases

WASHINGTON, D. C., Aug. 7, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until Aug. 15, schedule 9981, for 46 air compressors, f.o.b. works; until date not set, schedule 9988, for four horizontal centrifugal pumps for Brooklyn and Mare Island; and schedule 9990, for one horizontal boring, drilling and milling machine and one vertical slotting machine, for Mare Island.

The purchasing officer of the Panama Canal, Washington, will shortly call for bids for the following motor-driven equipment:

- One 20-in. triple geared engine lathe.
- One 17-in. hack saw, 160 ton incline frame.
- One 24-in. double-head shaping machine.
- One 3-in. single bolt cutter.
- One 13-in. sensitive drill, with equipment.
- One 32½-in. upright drill press.
- One 4-ft. radial drilling machine.
- One 36-in. engine lathe.
- One 12-in. double-head grinding machine.

The following bids were received by the chief of the Bureau of Ordnance, Navy Department, Washington, Aug. 2, for furnishing projectiles for the navy:

The Harrisburg Pipe & Pipe Bending Company, Harrisburg, Pa., 2500 6-in., \$12.50 each; 8000 5-in., \$11.75; 6000 4-in., \$8.50 each; 8000 3-in., \$3.75 each.

The Birmingham Machine & Foundry Company, Birmingham, Ala., 1200 14-in., \$73 each; 2000 12-in., \$58 each.

The Mobile Stove & Pulley Mfg. Company, Mobile, Ala., 2000 12-in., \$40.98 each; 1000 8-in., \$19.29 each; 2500 6-in., \$10.96.

The Bethlehem Steel Company, South Bethlehem, Pa., 1200 14-in., \$94.86 each; 2000 12-in., \$59.87 each; 1000 8-in., \$21.19 each; 2500 6-in., \$13.24; 8000 5-in., \$9.93; 6000 4-in., \$7.45; 8000 3-in., \$3.29 each; 75,000 1-pounder, 50c. each.

The Tredegar Company, Richmond, Va., 1200 14-in., \$74.95; 2000 12-in., \$47.87; 1000 8-in., \$20.95; 2500 6-in., \$13.74; 8000 5-in., \$10.54; 6000 4-in., \$8.09.

The American & British Mfg. Company, Bridgeport, Conn., 8000 5-in., \$8.93 each.

The Bridgeport Projectile Company, Bridgeport, Conn., 8000 3-in., \$3.85 each.

The Raleigh Iron Works Company, Raleigh, N. C., 1200 14-in., \$61.95; 2000 12-in., \$39.90 each; 1000 8-in., \$16.75 each; 2500 6-in., \$9.50 each; 8000 5-in., \$7.75 each; 6000 4-in., \$6 each; 8000 3-in., \$3.25 each.

